

Interactive comment on “The early Eocene equable climate problem revisited” by M. Huber and R. Caballero

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Thanks for the detailed editorial comments. In general, we should have no problem making most of the suggested changes. We have two responses to the main suggestion that we include a comparison with sea surface temperature data.

As a first response, it is our intent to publish as much of the raw model output as we can, so that, by downloading the data and citing our paper, individual investigators can take their own analysis in whatever direction they like without ‘filtering’ by us. This model output will include sea surface temperature data and as much else as we can fit within the confines of CP. Consequently we hope our paper and associated output will be lasting contribution as more proxy data and better calibrations are developed and the proxy interpretations continue their evolution toward the truth.

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As a second response, we believe it is key to recognize that the equable climate problem, as defined here (and has been defined for some time), has very little to do, necessarily, with sea surface temperature (SST) data. The equable climate problem in this definition focuses on annual mean temperatures and winter season temperatures within continental interiors and at high latitudes, which by themselves are little affected by SSTs. We have shown many times, (e.g., Huber and Sloan 1999, Sloan et al., 2001, Sewall et al., 2004) that even if high latitude SSTs were specified to be very warm, the impact on continental interior winter temperatures is minimal. Furthermore, the SST problem involves a vastly different physical setting, in which two terms that are essentially zero on land are large and potentially variable, i.e. in the ocean thermal inertia is substantial and ocean heat transport is a poorly constrained variable. So, while many of us believe it is likely that both the ocean and terrestrial parts of the problem can be solved parsimoniously through simple changes in global forcing and response, this is by no means guaranteed and the problems should be treated separately to give space and time to a full examination. While it is true that both the ocean and terrestrial proxy records have uncertainties associated with them, it has taken a quite a volume of verbiage and figures to even give a rudimentary description of the potential terrestrial errors and how those were dealt with in this paper, and a similar treatment of the SST proxies would more than double the length of this manuscript.

As a middle ground we will include a treatment of some of the SST proxy records in a general, perhaps schematic way (as we did in Figure 1 of Huber and Sloan, 2001, which seems to have had some success), in order to highlight the similarities and differences of the terrestrial and oceanic records. This will focus on tropical SST records because those are the main constraint that the ocean records provide on the equable climate problem, given the lack of sensitivity of continental winter interior temperatures to extratropical SSTs. We will also reword the manuscript to emphasize our choice of focusing on the terrestrial data with the motivation described above. We hope that will suffice.

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