

## ***Interactive comment on “Large-scale features of Pliocene climate: results from the Pliocene Model Intercomparison Project” by A. M. Haywood et al.***

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We would like to thank the reviewer for his thoughtful and considerate comments/suggestions.

- 1) We agree with the comment made regarding mid-Piacenzian versus mid-Pliocene and will make the appropriate correction.
- 2) Similarly, we agree with the comment regarding mid versus Mid and will correct the manuscript accordingly.
- 3) The comment regarding the applicability of time slab versus time slice proxy data is very important, and our intent requires minor clarification. Our opinion is that all data has value, regardless of the format in which the data is provided. However, our

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purpose here is to highlight the requirements placed on proxy data by climate models, especially where data/model comparisons are concerned. A physically-based model will never reproduce an unphysical reconstruction (i.e. a reconstruction of an ocean state that never existed at a single moment in time, and represents an average condition to time varying forcing). It is quite unfair to expect a climate model to be able to do so. So whilst time-averaged data has a great deal of intrinsic value, to compare to other time averaged data sets etc, its utility in terms of facilitating a connection to climate modelling, and especially for model evaluation, is limited - if indeed it can be claimed that a connection exists at all. As the reviewer himself states, from the point of view of using data AND models in concert to better understand the Pliocene, a time slice approach is an essential development.

All of the intrinsic complications of interpreting and understanding different proxy data sets exist in both a time slice and time slab approach. However, a time slice approach removes some of the uncertainties in environmental forcing, providing us with a better chance of seeing the wood through the trees. It also provides the models with a physically sound target to aim at. It provides a means to reduce uncertainty in both environmental reconstruction and modelling simultaneously.

- 4) The reviewers comments regarding intercomparison between different proxy data sets in deep time is very well made. Ultimately a palaeo-data intercomparison for deep time would be very beneficial to better constrain uncertainties in proxy reconstructions. It would be an invaluable partner to the model intercomparison effort. We would be happy to highlight this point in our conclusion.

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