Interactive comment on “Extreme warming, photic zone euxinia and sea level rise during the Paleocene/Eocene Thermal Maximum on the Gulf of Mexico Coastal Plain; connecting marginal marine biotic signals, nutrient cycling and ocean deoxygenation” by A. Sluijs et al.

M. Huber
huberm@purdue.edu

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Thanks, appy et al. for writing an excellent paper on an interesting and important topic. Most of it I’m not qualified to comment on, but I do have a couple of specific and general questions and comments.

I’ll start simple and factual and work my way to more philosophical issues.

Where actually is/was the Harrell Core located? Seems like a simple question, but the literature is vague on this. How about an actually latitude and longitude? Meridian MS and the associated Red Hot Truck Stop (after extensive research a physical location for the famous defunct landmark can be inferred from information here http://redhottruckstop.tripod.com/index.htm) are at 32 deg 22 min latitude -88 deg 40 min longitude. When I plug that information into Gplates (probably better to use the Boyden ref below than the Muller 2009 ref) I get a paleolatitude of 32.9 at 55 Ma (or min longitude. When I plug that information into Gplates (probably better to use the Boyden ref below than the Muller 2009 ref) I get a paleolatitude of 32.9 at 55 Ma (or)

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leocene and latest Paleocene/EECO intervals. If I chose the hotter values from the MAAT records it is also possible to get a reasonable match between the models and data. (There’s no question that one might alternatively pose a very unflattering picture for models and theory by using TEXL or the Peterse calibration, but my interpretation of the spread of the various calibrations is that those are giving us some information about how little we really understand about these proxies still). So, on the basis of the simulations and proxy data we have I do not see a compelling reason to say, “Although more estimates from tropical regions are required, our data might be inconsistent with the recently proposed hypothesis (Huber and Caballero, 2011) put forth to explain extreme warmth at high latitudes, that low latitude regions were much warmer than previously anticipated. In their scenario, SSTs outside the PETM along the GCP should have been > 35 C (Huber and Caballero, 2011) while all available data suggest temperatures well below 30 C.”

On the contrary, the model predicts values between 25-30 for the cooler parts of the Paleocene and ~33 for the conditions that should correspond to just pre-PETM values. I have not published results on simulations that correspond to peak PETM conditions (i.e. that match existing mid-to-high latitude temperature reconstructions).

I think that this is an overstatement, “Therefore, although uncertainties remain regarding the accuracy of the TEX86 and MBC/CBT proxies, our data may reinforce the notion that current climate theory (Huber and Caballero, 2011; Lunt et al., 2012) cannot yet fully explain the low meridional temperature gradients during the early Eocene and the PETM.”

Actually, I’m surprised by how well the model is performing 55 million years before it’s calibration/tuning interval. A couple of degrees of error is well below either the error bars in the proxy data and the ability of modern models to achieve a match in a given region to modern observations. On the other hand, if the TEXL or Peterse interpretations were right, that would be quite a fundamental problem.

Matthew Huber


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