

Interactive comment on “Mismatch between the depth habitat of planktonic foraminifera and the calibration depth of SST transfer functions may bias reconstructions” by R. J. Telford et al.

Anonymous Referee #3

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Review of Telford et al. “Calibration depth of foraminifera-SST transfer functions”

Telford et al. present a study on the calibration depth of a planktonic foraminifer transfer function (MAT) in the North Atlantic and apply this to records spanning the last glacial/interglacial transition. For the tropical to subtropical ocean they reconstruct significant differences in the temperature profiles for water depths covering upper 500 m. The study is pointing out important issues and is in particular relevant for model/ data comparisons. The paper therefore has merit to be published in Climate of the Past. Prior to publication I would, however, like to see a few topics discussed/ presented better in the paper.

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Major points: 1) Overall, the authors use references to former works very sparingly. There are many more plankton foraminifer studies that would deserve citation. For example on p. 4078 line 2 reference to Mulitza et al. 2003 (Paleo 3), Rosenthal et al. 2000 (Paleoceanography), Ganssen and Kroon 2000 (J Geol Soc London) or Elderfield and Ganssen 2000 (Nature). Instead of Cleroux et al. 2009 I believe a more appropriate reference would be Cleroux et al. 2008 (Paleoceanography) where the calcification depths are actually defined. Likewise on p. 4083 line 21 reference to any of the North Atlantic studies by Schiebel et al. should be included or the more recent studies by Storz et al. 2009 (DSR I) or Wilke et al. 2009 (DSR I) –to name a few. Likewise the Lynch-Stieglitz et al. 1999 reference is just for one current in the wide North Atlantic; so there should be either an “for example” added or reference(s) to other changes in other current systems or the overturning circulation itself. 2) Why was the MARGO dataset used for this study and not the larger dataset of Salgueiro et al. (2010) that would add calibration data for the eastern boundary current system? Furthermore, why was core SU81-18 selected over higher resolution data (e.g. core MD95-2040; de Abreu et al. 2003 or several others for which the faunal data is available in the Pangaea data base) available for the region? 3) The authors should explain what depth range they are referring to with “subsurface” vs. deeper (permanent thermocline?) temperatures (e.g. p. 4082 lines 21-22). 4) Sometimes I am missing references to the prevailing hydrographic conditions in the discussion such as why is there no mentioning on p. 4082 that SU81-81 is potentially under seasonal upwelling influence or could about the annual persistence of the Cape Blanc upwelling system even though the faunal data apparently explains more the summer situation. Why is there no mentioned to the North Atlantic’s equatorial current system for the tropical sites? Couldn’t some of the variations (over time; Fig. 4) seen in core V30-36 be linked to the position and depth of the Equatorial Current or Countercurrent? Or in Site V22-222 to changes in the position of the subtropical front/ Azores Frontal system (and related changes in the gyre circulation)? 5) p. 4081 and ff. and Fig. 4: Not being familiar with the faunal data I wonder how much of the variability seen at the different depth levels is driven by

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changes in the faunal composition. So I would like to see two records added for each core site: 1) a sum of the major surface dwelling planktonic foraminifers (e.g., *G. ruber* + *G. sacculifer*); 2) a sum of the major deep dwelling planktonic foraminifers (e.g., *G. menardii*, *G. tumida*, *G. truncatulinoides*, *G. hirsuta*) 6) Comparison to climate models: please give more information on the models as not every reader will be familiar with the particularities of each model. For example, is any of the model a transient model or are the years given in Table 2 the year after spin-up for the respective time slice. Since the model data is available why is there no comparison to/ discussion on the subsurface to “deeper” temperature variations seen in the climate model(s) in comparison to data variability shown in Fig. 4? 7) Figure 5: Please limit the y-axis scale ranges to 3 or 4 and don’t use a different scale for each core. Also mention in the figure caption that the scales vary and add what the dashed line is indicating. In my opinion geographical neighbors such as HM107-04 and -05 should be plotted next to each other to allow a direct comparison.

Minor things: p. 4076 line 6: CMIP5 abbreviations only explained on page 4080 p. 4076 line 10 and 25: Last Glacial Maximum abbreviation already introduced in line 8 p. 4077 line 13: verify spelling as I assume the word should be “uncertainty”.

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