

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 #2

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This article presents results from a statistical study comparing reconstructed temperature signals from planktonic foraminifera assemblages with atlas temperatures between 0 and 500 m depth. These results demonstrate that the transfer function performance is higher around 100 m depth than at 0 m depth, especially for summer temperatures. Therefore, biases in reconstructed sea surface temperature (SST) can arise if the thermal structure of the upper ocean changes with time. The authors illustrate this by applying a transfer function calibrated against different depths to census counts records from Atlantic cores over the last 30 ky. They obtain a marked cooling at 100 m in an equatorial core, in contrast to a modest cooling at near surface depths. The article ends with a discussion of the implications of this type of bias and possible solutions.

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This is one rare example of a very well written article. I only have a few comments but the article is already quasi ready to be published.

Main comments

1) p. 4081, l. 20-21: it would be clearer to specify that this concerns the proportion of the variance in the fossil data along each core because it is not common to consider in the same statistical analysis reconstructions from very different climatic contexts (i.e. LGM, deglacial millennial variability, Holocene). Figure 5 is a bit difficult to read and the caption too short: I would recommend to use the same Y-axis scale for all panels and give more information in the caption, notably the fact that the proportion of the variance explained shown concerns fossil data along the core and that the dashed line indicates the threshold above which the reconstructions can be considered to be statistically significant.

2) p. 4081 l. 24 to bottom of p. 4082: this portion of the manuscript is purely descriptive and thus less interesting. I would recommend to shorten it.

3) Discussion of Fig. 6 results is a bit too brief: it would be interesting to know where the most similar profiles in the pre-industrial are located and if this location is the same for all models.

Minor remarks

- Section 4.3, the first sentence is unclear: it seems that the authors mean “if paleoceanographic change can be thought of as geographically (i.e. horizontally) expanding and contracting water masses . . .”

- p. 4086, l. 23: “shallower” is confusing here, I would recommend to use “weaker” instead, as in Fig. 7 caption.

- p. 4086, l. 26: change “. . . will in the past . . .” by “. . . would in the past. . .”.

- p. 4087, l. 5: change “it may likely sufficient” into “it may likely be sufficient”

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- Fig. 7 caption: change “weaker stratification will be biased warm” into “weaker stratification will be biased toward warm temperatures” or “weaker stratification will have a warm bias”.

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