

Responses to editor's comments

I typed these responses in the 'reply' box associated with each comment in the PDF supplied. However, the replies would not save, so I have abstracted all the text and entered it below, with the line/figure number of the relevant 'sticky note' in the PDF.

L38

Editor: A result of a stronger natural smoothing, since each measurement incorporates a longer time interval than what will be integrated in the mean annual results based on the schlero-data?

ALAJ: Although individual shells give seasonal temperatures for individual years (and sequences of years) the seasonal values used for comparison with alkenone and TEX₈₆ temperatures are means of individual seasonal values over stratigraphic intervals. They are thus averages in much the same way as alkenone- and TEX₈₆-temperatures. The annual temperatures are similarly comparable, being the midpoint between (average) summer and winter values.

L62

Editor: suggested to be?

ALAJ: OK - I guess there is not yet a consensus. I have changed 'is now thought to be generally' to 'has now been suggested to be'.

L78

Editor: Is the reference to mid-point here from Dearing Crampton-Flood? If the winter signature of tex reflects living depth rather than surface season, I will argue that its value will reflect annual mean independent of blooming season because temperatures are stable year round below the summer mixed layer (e.g. Jansen et al., 2008; Risebrobakken et al., 2011).

ALAJ: The notion of the mid-point being close to mean ASST comes from us. I have made this clear by various modifications of the text around here. Dearing Crampton-Flood et al. (2020, pp. 533-534) argue strongly that their TEX₈₆ data reflect winter surface temperature rather than (average) temperature at depth (the isoGDGT-2 / isoGDGT-3 ratio pointing towards a shallow water origin, the basin not being very deep anyway, and the main period of thaumarchaeotal blooms and associated isoGDGT production in the modern North Sea being in the winter months). I don't think this is the place for going into the evidence, but I have

drawn attention to its existence and made it clear that the TEX-86 and alkenone temperatures, are interpreted as winter and summer surface figures, respectively.

L218

Editor: specify what other issues you refer to here

ALAJ: They are issues about how to determine seasonal temperatures when growth rate is variable. Ivany and Judd (2022) favour a particular mathematical approach but it is not applicable to shells from sub-thermocline situations - i.e. the likely setting of some of those considered in this paper. I have explained this in the revised version.

Fig. 6:

Editor: I still consider the font size at the axes (numbers and axis names) to be too small and would recommend to increasing the size even more to make it readable. Now I need to blow it up to at least 200% to be able to read it. The same is the case for the legend and the microgrowth increment height numbers. Compared to the font size used e.g. for (a), (b),... and AO3, AO4,... it is very small. It is correct that it will increase in the final version, but there is still room for improvement.

ALAJ: Increasing the size of the axis fonts reduces the size of the plot area in the Excel software used to create each part. To avoid this negative effect while still doing something to increase font sizes, I took the following actions: (1) in the originals of the 'AO' plots I increased the size of the smallest font used (for the values for increment-height variation in the green-bordered boxes) to that of the corresponding axis units; (2) in the ultimate figures (Figs 6, 7) I increased the size of all the parts about 4% by cropping the margins of each and then enlarging the remainder to fill the space created; (3) I increased the font size in the legend of Fig. 6 (which also applies to Fig. 7). I think these actions have addressed the legibility issues (compare the old and new versions in the 'tracked changes' file).

L675

Editor: Is something missing here? different what?

ALAJ: Yes, there are a few words missing here. Like the missing Fig. 8 and caption to Table 2 (see below), the missing words are present in the 'tracked changes' Word file from which I made the submitted PDF, so something 'funny' clearly happened in conversion. This may recur when I produce the 'new tracked changes' PDF but I will make sure that the 'clean' PDF is complete.

L697

Editor: Figure 8 is not added here - but I do see that its added in the version without track changes. And no Table caption is given for Table2 (but I do see it in the no track changes version)?

ALAJ: Both Fig. 8 and the caption to Table 2 were present in the 'tracked changes' Word file from which I made the submitted PDF. See the response to the comment above.

L845

Editor: Even when comparing to a annual mean from the schlero data presented here, the biomarkers are likely more smoothed since each measurement is likely to incorporate a longer time interval than the life time of one of the molluscs, so will the comparison be fair?

ALAJ: The comparison here is with mean seasonal temperatures from sclerochronology. I have changed 'interval mean temperatures' to 'interval-mean seasonal temperatures' to make this absolutely clear. See also the response to the first comment.

L936

Editor: This is a statement. What is the argumentation for why there is no reason to suppose?

ALAJ: The statement is based on independent evidence of environment and the latest interpretation of age. I have included a pointer to this information (provided in Section 3).