Review:

Upper ocean temperature characteristics in the subantarctic Southeast Pacific based on biomarker reconstructions.

Hagemann et al. 2023

Overall comments:

The numbering of lines every 5 lengthens the reviewer task, please number each line next time.

While the article is well written, style is heavy and unnecessarily long, I suggest the authors edit down to go straight to the point.

Authors must add primary-original references or reviews, especially in the introduction.

Please check the following reference for applicability of GDGTs in cold areas:

https://www.jstor.org/stable/26937748

Detailed comments:

Abstract:

Writing style should be more to the point-simple sentences that engage the viewer.

Line 19-20: needs clarification residual errors? Sikes overestimates but what is then the residulas?-Please simplify-clarify

Lines 20-23: rearrange-simplify-break into 2 sentences? . Ej: Whereas alkenone estimates in the Southern Pacific reflect mean annual values.

Line 23: We show that for GDGT-based temperatures, a more complex pattern emerges. This really says nothing, please eliminate and rewrite lines 23-26.

Line 26: Based on a qualitative assessment of the GDGT [2]/[3]-ratios . This is unclear the ratio is a quantitiave value how do you evaluate it qualitatively?

Line 27: 0-200 is not really a subsurface signal since it includes the surface-please clarify

Lines 28-30: Not clear if you are referring to both proxies or only GDGT ones. Also not clear why relative changes would not be reliable if the absolute values are wrong-please explain.

Lines 30-32: Not clear what you did, you suggest a new calibration with TEX86L?-do you suggest TEX86L does not work in the study area?

Introduction:

Line 34: missing alkenone reference

Line 35: need to acknowledge review-wider studies for this statement-Herbert reference is only for tropical oceans!

Line 37: this was established way before 2005

Line 43: Please change beginning of sentence, e.g: Henceforth we use….

Line 45-46:missing references

Lines 45-47: I suggest merging into 1-simplify

Line 49-~~However~~-you are not contradicting previous statement

Line 50: Unclear what principally wider means-rewrite sentence

Lines 50-54: rewrite:

In ~~the case of~~ our study region, samples from the Central South Pacific ~~are~~ most likely ~~to~~ represent either summer temperatures (with the Sikes97 calibration) or an annual mean (Muller98 calibration;
Jaeschke et al., 2017). Prahl et al. (2010) ~~instead,~~ using samples from the Chilean continental slope, found a slight seasonal
summer bias south of ~50° S.

Line 54-55:rewrite

Line 57-58: Delete

Lines 59-65: rearrange form general to specific.

Line 70: you need to explain better why it is qualitative

Line 75: I think there are several more articles on this-add artciles or e.g.

Line 76: ~~In the following~~ not how you say this in English

Line 87-89: it seemed in the abstract that the problem was in the northern part?

Line 90-95/100-105: cite fig.1 thought

Lines 112-114: You need to justify the use of two different extraction methods for GDGTs it is important (see Huguet et al. 2010;
https://aslopubs.onlinelibrary.wiley.com/doi/pdfdirect/10.4319/lom.2010.8.127). Were the two extractions used randomly or differential for datasets?

Line 125: you mean extraction or measurement?

Line 126-136: If you used different measuring setups are you sure they give equivalent results? Did you do some cross measurements? This is usually not so straight forward-see intercalibration studies by Schouten et al. 2009-2013. This could potentially bias your results, please elaborate this since it is crucial to validate your results.

Results and discussion:

Lines 142-145: I would like a more impactful start of the section-it should makes readers want to continue

Line 144: Again please change- In the following

Section 4.1-Is basically results…Maybe consider separating results form discussion? Or increase the discussion-did other authors compare the two calibrations? Did other studies find similar results?-deviations?

Line 161: Not clear why Fig. 4-different format?

Line 166: you need to frame these results-have others found the same? Why do you think this is the case? Please add discussion.

Lines 167-169: Re-write, simplify, add discussion

Line 171-173: It is not clear why the water column structure will affect signal- seasonality specially since alkenones indicate SST please clarify.

173-175: equally unclear the effect of diversity on the UK37-Expand

Lines 180-184: re-write, not clear why your results are different form other regions.

Lines 185-190: reads like methods

Lines 190-195: You seem to be discussion Jaeschke's article plaseclarify the link-relation to your results.

Lines 195-200: rewrite, unclear.

Line 199: What do you mean by changing competion?

Lines 204-205: how does stratification favour a bloom?

Lines 210-214: Please rewrite: confusing, organize, simply

Line 219: What you mean by greater latitudes? Are alkenones not globally distributed?

Lines 223-228: I don't understand why you apply TEX86H in this area

Lines 229-232: This makes sense since you apply a calibration inadequate to the area remove or rewrite.

Lines 236-237: Why? Discuss some options-were the lipids extracted-measured in a different way?

Line 239: Time series? Not clear to me

Lines 255-257…:Please discuss why you think this is the case-right now it is only results

SECTION 4.4.: you may want to have a look at the Ingalls et al and Huguet et al. 2022 publications: https://journals.asm.org/doi/full/10.1128/AEM.07016-11

https://www.sciencedirect.com/science/article/pii/S0031018222003091

and references therein to discuss the issue of depth provenance of the signal fully

Line 282: change In the following

Lines 320-324: Please use this to structure and simplify Lines 290-320. Also add some discussion as the reasons why you see changes between different water column-coastal-open ocean settings, otherwise it is just results.

Lines 325-335: Please revise Fietz et al. 2020 (https://www.jstor.org/stable/26937748) publication and references therein. Improve the discussion by better explaining what is the expected effect of NOT including the OH-as seen by others in cold areas.

Lines 367-368: Please clarify that your calibration fits better with actual results.

Conclusions:

Lines 371-375: Not conclusions

Line 376: rewrite, strange English

Line 390: You already said what you did, limit yourself to conclusions please.

Line 392: Separate Since in different paragraph-may want to rewrite

Tables:

Legends are not self explanatory-please extend.

Figures:

Figures are nicely executed, in some cases they seem a bit blurry or text is cut which may be the result of PDF buidlup.

Figure 12 has a frame which I think should be removed.