

Reply Letter2

for the manuscript "*Upper ocean temperature characteristics in the subantarctic Southeast Pacific based on biomarker reconstructions*" by Hagemann et al. (2023)

Dear Editor and Reviewers,

Thank you for your nice review and please find attached our corrected manuscript.

Public justification (visible to the public if the article is accepted and published):

Thank you for your comprehensive replies to the two reviewers, and your submission of your tracked changes document. For the most part the concerns raised by the reviewers have been addressed. There are some minor typos or corrections which will help to further clarify the text:

Check author names (e.g., Brassell not Brassel, Muller not Muler...) and spellings (e.g., Weddell not Wedell).

- We read the paper carefully and tried to correct smaller mistakes, e.g., "Wedell Sea"
- Furthermore, we also checked over the above-mentioned citations.

New text in reply to lines 167-169 (reviewer 1): "In addition, not all data uniformly show a seasonal trend. The poleward increasing seasonal trend along the Chilean margin is discontinuous twice and reflects an annual mean instead (Figure 4; red circles)." This is still confusing, and could perhaps be re-phrased: "Not all data can be described by the poleward increase in the seasonal influence, since at two locations along the Chilean margin an annual mean temperature is reflected instead"

- We agree with the Editor and have used the suggested wording.

Reply to reviewer 1 lines 180-184: Does the second sentence contradict the first? The "latter" of sentence 2 sounds like it is referring to the formation of a prominent mixed layer, yet the text suggests that this is referring to a "less stratified upper ocean signal" if you use only the sentences here in isolation. I can see from your tracked manuscript that in fact you are referring to processes in earlier sentences. Instead of referring to former/latter can you be specific about what you are referring to? e.g. "In the South Pacific, the year round deep mixing within the ACC prevents the formation of stratified waters and a prominent warm water

layer during the summer, so that subantarctic SSTs are expected to show less seasonal influence on their signal than the North Pacific"

- We agree with the reviewer and moved part of the sentence "... and to pronounced seasonal summer warming within strongly stratified surface waters." to the sentence part that addresses the north pacific.
- The total paragraph now reads: "The subarctic front in the North Pacific acts as a natural boundary, creating a highly stratified subarctic surface ocean with a permanent halocline and to pronounced seasonal summer warming within strongly stratified surface waters. In contrast, the transition in the South Pacific from subtropical to polar regions is characterized by a lower salinity gradient and stratification, leading to a less pronounced SAF. The year-round deep mixing within the ACC prevents the formation of a prominent warm water layer during the summer. Thus, subantarctic SSTs would be expected to show less seasonal influence on their SST signal."

In your reply to reviewer 1 Section 4.4 you refer to the relationship between GDGT [2]/[3] ratio and dust, and refer to Figure 12 and a "near-perfect relationship". I find it very difficult to confirm such a strong relationship with this Figure, partly because the colour palette is almost but not completely the same for the underlying dust and the GDGT ratio. For a "near perfect" fit I'd expect to see e.g. oranges and reds for high [2]/[3] overlying oranges and reds for low dust, whereas low dust is blue and on a different colour spectrum to the GDGTs (yellow for dust is max, whereas yellow for GDGTs seems to be intermediate?). Either use scatter plots for extracted data (as you do earlier) or try to align the colour scales for both data sets. At present Figure 12 does not support the strongly worded text.

- We agree with the Editor and changed the wording from "near perfect fit" to "visually good correlation"
- Furthermore, we have reworked our graphic and adjusted the color scale for the GDGT 2/3-ratio, to better emphasize the correspondence. The color scale now ranges from white (high GDGT 2/3-ratio) to dark blue (low GDGT 2/3-ratio). We have not considered the yellow color spectrum of the dust distribution, because a) we have no data in the region east of South America and b) it is a "relative" correlation, based on scale I set on e.g., the GDGT 2/3-ratio. The graph is only meant to demonstrate that in the South

Pacific, the dust influence on the TEX-index might play a role as motivation for future works.

Line 76 in the tracked manuscript includes some leftover text from the previous version ("The number of moieties")

→ We thank the editor for mentioning this and deleted this term.

Line 223 in the tracked manuscript needs WOA for world ocean atlas

→ We corrected it.

Notification to the authors by Polina Shvedko:

Please ensure that the colour schemes used in your maps and charts allow readers with colour vision deficiencies to correctly interpret your findings. Please check your figures using the Coblis – Color Blindness Simulator (<https://www.color-blindness.com/coblis-color-blindness-simulator/>) and revise the colour schemes accordingly.

→ We thank Polina Shvedko for this comment and checked our Figures with the website. Most of them are fine for Red/Green/Blue-Blind people. It can be difficult for Red/Green-blind people to recognize the warmer temperatures in the maps, but since the focus of this work is in the southern area, we think this is fine. We have to mention here that nearly all maps are difficult to read for Monochromacy/Achromatopsia people. Furthermore, in most of the Graphics are different symbols used together with colors, which simplifies the recognition of the essential statements of the figures. All in all, we think the figures are quite fine also for color blind people.