

Response letter for EGUSPHERE-2025-1826 titled

“Seismicity and thermal structure of the St. Paul Transform System, equatorial Atlantic: Insights from focal depth analysis” by G. de Melo, I. Grevemeyer, S. Liu, M. Maia, and L. Rüpke.

Please find attached an improved and revised manuscript according to the suggestions of the two reviewers. We also prepared an annotated version of the manuscript showing all modifications (new text is underlined, deleted text canceled).

The reviewer comments are in *italic font* and our replies are in **normal font**.

Reviewer # David Schlaphorst

In this manuscript, the authors present a focal depth re-analysis of 35 earthquakes on the St. Paul Transform System using teleseismic stations in Africa and Brazil. They find that the earthquakes are generally located deeper towards the centre areas of the transform segments and shallower at the ridge-transform intersections. Placed within half space cooling models, they find cooler mantle at the centre of the transform faults. The results and implications should be interesting for the readers.

R: We are grateful to you, referee, for evaluating our submission and acknowledging our study. All issues raised and suggested by you were addressed and resolved.

In general, this manuscript has a good structure and the setup, progression of points, as well as the thoroughness of the study are logical and easy to follow. Likewise, the figures are relevant to the text and mostly of good quality, but I will point out a few minor to moderate issues below. My comments are primarily of technical and typographical nature, therefore I recommend publication after technical corrections.

R: Many thanks for your considerations. We have applied all technical corrections indicated by you.

I will start with two broader issues.

1. Use of a rainbow colour scale in multiple figures: it would be better to not use rainbow scales, as these can be very hard for colourblind people to understand.

R: We have changed the rainbow color scale in figure one for another one more balanced to people with colorblind. Thanks for highlight that point.

2. Depth “below seafloor (bsf)” – I might be wrong here, but I think that this is not used consistently throughout the manuscript (e.g., l. 269 or l. 304). If all of the depths are given below seafloor, it would be easier to state that in the beginning and then not having to use the “bsf” every time.

Below I will list my specific corrections.

l. 16: “5.3³Mw³6.9” – there seems to be some formatting error here.

R: Yes, it was a formatting error. The correction was applied.

l. 75: “Saint Peter and Saint Paul Archipelago” – it would be good to show (and annotate) this on the map.

R: We included the name of the island on new Figure 01 and the Figure S01-S03.

l. 101: “2.1” – it would be better to have at least two sub chapters in a chapter. Therefore, the first part of “2. Study area” should be a sub chapter as well.

R: Thanks for suggestion. We defined the first part like the “Tectonic of the St. Paul Transform System”, keeping the old 2.1 as the new 2.2 subchapter.

l. 197: “Mw” – this should be in italics with a “W” subscript.

R: Yes, we agree. We have replaced all old “Mw” to the correct representation in italic. We are grateful for your check.

l. 233: “neither comparison” – “neither the comparison”

R: Done.

l. 253: “focal depth my vary” – “focal depth may vary”

R: Correction applied.

l. 269: “10 kilometers” – “10 km”

R: Done.

l. 271: “beneath the seafloor” – “bsf”

R: Change applied.

l. 286: “3-dimimensional” – “3-dimensional”

R: It was corrected. Thanks.

l. 330: “are strongly segments” – “are strongly segmented”

R: Thanks for suggestion.

l. 339: “3-Compared” – “3. Compared”

R: Thanks for identify this minor error.

l. 340: “Furthermore, the shallower earthquakes hotter areas close to the RTI.” – This is not a complete sentence.

R: We edited that phrase merging with the previous sentence to be more logical the comparison between the focal depth and the local temperatures. Thanks.

l. 348: “GWSdM [...]” – that whole sentence has multiple grammatical errors.

R: We sorry for mistakes. Correction has been applied.

l. 352: “Thank captain” – grammar

R: Correction done.

l. 353: “Funding COLMEIA ship time was funded” – this sounds strange to me.

R: Yes, we rewrite the phrase. Thanks for pointing that out.

l. 360: “were downloaded by EarthScope” – do you mean “were downloaded from EarthScope”?

R: Correction applied.

Figure 1:

- The text “a)” and “b)” seem to be cut off.

R: Yes, we identified that and applied the corrections to see the text complete. We also applied some changes of color in Figure 1 to improve the visibility to people with colorblind. Thanks for your observation.

- Details in (a) , such as annotations, are too small. Maybe make the histogram inset an extra subplot, there would be space next to the map in the top row.

R: Thanks for your suggestion. We have plotted a new version of the Figure 1 with the histogram inserted in big size on updated Figure S04. We did not include the histogram in updated Figure 01 to better present the study area in first figure.

- Is there a better way to visualise the transform fault and MAR sections? Because the red and black lines are almost invisible, since they are covered by event circles.

R: We have plotted the new version with the increasing the size of the transform fault and MARs trace, with a little decrease on circles. From that, the visualization of the transform faults and MAR, as also the epicenter, are better highlighted. Thanks for your comment.

- *The black circles in the legend should be white.*

R: We applied the correction on legend symbols. Thanks.

l. 577: “White square” – it is not a square, so I would write “The white box”

R: The change was done. Thanks.

l. 583: “(doi:[...])” – I am not sure if this is needed here, it could be in the data availability statement.

R: We have replaced the DOI weblink to the original reference of the GEOSCOPE network, also informed in the data availability.

Figure 2: The colour coding is opposite to the previous figure (red and black lines).

R: You are correct, and I am sorry for mistake. We have plotted an updated version with the gray slope bathymetry in background, and the transform faults and MOR line colors corrected. Thanks.

Figure 3: The magnitude is given by 6.9 in the top left and the caption of the figure, but as 6.68 on the right of the figure. Maybe a short explanation is needed as to why the difference is larger here.

R: Thanks for your observation, it was just error on plotting. The correct is Mw 6.88 obtained in inversion.

Figure 6:

l. 811: “The a) Comparison” – remove “The”

R: Thanks, the change was applied.

Figure S04: “Map with the locations of the 21 earthquakes” – “Map with the locations of the 21 stations”

R: I am sorry for mistake. We apply the correction replacing the “earthquake” term to “stations”, which is the correct.

*David Schlaphorst
Lisbon, 25/06/2024*