In the manuscript by Hass et al., authors perform a series of seismic and shipborn potential field data inversion to model the density and susceptibility of the oceanic crust and lithosphere in the ancient transform fault zones of São Tomé and Principe in the eastern Gulf of Guinea. Results show that these transform fault zones present low susceptibility and medium to high density, reflecting increasing pressure and temperature, what potentially generates metamorphism of the oceanic crust up to greenscist facies. The manuscript is well written and conceptualized, and both the data and the modeling are consistent and relevant for the study of plate tectonics, especially in the oceanic domain. I recommend the publication of this manuscript after a few minor modifications.

We thank the reviewer for taking the time to read through our manuscript and appreciate the appraisal that our manuscript is relevant for plate tectonics in the oceans. The comments are helpful to improve the quality of the manuscript and have been addressed in the revise manuscript. Below you find our replies step-by-step (blue colour).

Comments by lines:

1. l.21: Please specify the facies change (prehnite-pumpellyite to greenschist?).

   We have specified the facies change.

2. l.30-33: This sentence is unclear, what can be located within the oceanic crust?

   We simplified this sentence by using the term potential field data instead of gravity and magnetic data.

3. l.33-35: For me it's not clear what are the "sources", and how they can change. I encourage a conceptulization of this terminology.

   The term "sources" was a bit misleading. We added a sentence, stating that gravity and magnetic anomalies are caused by variations in density and magnetic susceptibility in the subsurface

4. The addition of sediments increases the density and susceptibility of the crust? Why?

   We rephrased the sentence and clarified that the addition of sediments may decrease the density contrast in the oceanic crust underneath.

5. l.38: "generated by spreading ridges", the strike slip movement can happen far from the spreading ridge itself.

   We totally agree with the reviewer that strike-slip movement is not necessarily linked to spreading ridge only. However, in the simple view we introduce here, strike-slip connects the offset in spreading ridge segments. This does not exclude that strike-slip is observed in other tectonic settings.

6. l.41-43: mass deficit meaning crustal thickening? Seems contradictory, please explain.

   Negative gravity anomalies indicate a deficit of mass in the subsurface. For fast-slipping transform faults this may be explained by thickening of oceanic crust (Gregg et al. 2007). By thickening the crust, densities are lower than the surrounding mantle, causing a negative signal in the gravity data. We specified the sentence in L.41-L.43 by adding "negative" gravity anomalies.

7. l.43-44: Please improve grammar, confusing.

   Corrected.

8. l-50-56: Can you provide a schematic figure of these potential TNDR-B processes?

   We added a sentence and refer to Figure 7 in Thomas et al. 2022, which shows an interpretation of Transform Normal Dipping Reflectivity at fracture zones.

9. l.63. "São Tomé and Principe transform fault zones" I suppose.

   In this sentence, we only explain where Sao Tome and Principe is located, without referring to the fault zones.

10. l.70: Please label the CVL in Fig. 1.

    We added the CVL as red dashed line.

11. l.78: Please label the Central Fracture Zone in Fig. 1.

    Added.

12. l.91: the high rugosity?

    The oceanic basement roughness is a function of spreading velocity. That relationship is well established: slow/ultraslow spreading gives "rough" oceanic basement, increasing velocities produce smoother oceanic crust. We added a sentence with a reference that explains rugosity.

13. Fig. 1: Black bold line is the LaLOC? The C34y could be clearer, try yellow if this is an important feature to be shown. Can you also highlight the spreading ridges?

We clarified that the black bold line indicates the LaLOC. We changed the colour of the C34y magnetic chron to yellow. We believe it is important to show on the map, because it marks the last magnetic signature on oceanic crust before the Cretaceous Quiet Zone. Spreading ridges are not shown on the map.

14. l.106: CGG Multi-physics is a software? Or an instrument?

    CGG Multi-Physics is the company that conducted the acquisition of the data.

15. l.113: removal of what?

    Based on Review 1, we extended the section of gravity data processing and explain the Eötvös effect in more detail.

16. l.180-181: "Here we use this software to invert..."

    Corrected.

17. l.184-185: are you talking about a detachment fault? Or some other concept? I don't understand how inverted data can "provide space for detachment", but I might be confused by the geophysics jargon, can you explain better in the text what is this detachment?

    We specified that the lower crust provides enough space for previously identified surfaces of enhanced reflectivity (TNDR) to detach on the Moho boundary.

18. l.221-223: density is high also to the right of your delimited TNDRB 3. There is some explanation for that?

    Likely, this structure can be attributed to the high density close to the FZ. However, in the following 3D modelling, this structure does not appear with an anomalously high density, but rather represents average lower oceanic crust.

19. In Fig. 8 d the dashed circle for TNDR 3 is bigger than the polygon in c. In c, from TNDR 5 to the red polygon to the right, there is not such a contrast in density or susceptibility, do you think they could represent the same structure?

    We thank the reviewer for raising this point. The dashed ellipse in Figure d) marks the area, where reflections are evident and were interpreted by Thomas et al. (2022) as TNDR structures. We agree that the density and susceptibility contrasts towards the SE of this section is more indistinct compared to the other sections. The TNDR 5 block might be extended more the SE, replacing parts of the adjacent C5-type lower crust (red body). To acknowledge the geometries of the clustering we decided to maintain the lateral boundaries between the bodies in the lowest. However, we state in the manuscript that the TNDR 5 body might be more extended to the SE, as suggested by the reviewer.

20. l.398-400: The density and magnetic properties are caused by the mineral composition, I think you mean “changes in the density and magnetic properties” which can be caused by the factors you describe.

    Corrected.

21. l.406: “which are often” or similar term, hydrothermal alteration is not the only reason for this metamorphic conditions.

    Corrected.

22. l-410-413: In the last phrase, add that it’s unlikely in your study area, not in any all lower crust.

    We agree with the reviewer and clarified that serpentinization of the lower crust is unlikely in the study area, but likely as a general concept.

23. 418-420: This sentences seem contradictory with the first ones. So, you suggest greenschist was reached in the segment of crust you are studying or not?

    We agree that the essence of the sentence was misleading. We rephrased the sentence and clarify to suggest that indeed Greenschist Facies was reached in local segments of the lower crust in the study area.