

The revised manuscript by Hass et al. presents a meaningful discussion of the significance of oceanic fracture zones and spreading ridges using diverse geophysical data inverse modeling. The new figure 11 does a great job on coupling the proposed tectonic and metamorphic processes, however, I would still add something about the different magmatic phases in the schematic diagram, since it's an important part of the interpreted origin of hydrothermal fluids for metamorphism. Although this minor review, I think the text is well written and organized and the results are relevant for the field. I thus recommend the publication of this manuscript under minor revisions and I attached a PDF with few comments. Good job!

We appreciate that the reviewer likes our revised manuscript. In Figure 11, we added subsidence and TNR extrusion patterns, as well as the J-shaped Unit 2. These are indicators for the two magmatic phases, affecting the tectonic and metamorphic processes.

Below we address the main comments, apart from technical corrections, indicated in the PDF:

Which major metamorphic phase? Cite the phases transition, please.

We clarified that we discuss the transition from Prehnite-Pumpellyite to Greenschist Facies.

Are the different metamorphic facies associated with the different "tectonic phases" described in lines 23-24? If yes, I would add "respectively" and I would wait to see it discussed in the text.

We think that the term "respectively" would be misleading in the context. However, we split the sentence to connect that the change in susceptibility requires a change in metamorphic facies.

You have deformation though, extension can generate metamorphic textures with preferred oriented minerals as well. I would add this possibility in the text, unless your geophysical interpretation is that you have an isotropic structure in those zones.

We agree that deformation can generate metamorphic textures. In the sentence addressed by the reviewer, we just wanted to state that our interpreted hydrothermal alteration occurs on a much smaller scale than regional metamorphism, rather than focusing on orientation of the minerals.

Dear authors,

thank you very much for your response to my previous comments and the revisions you made. In my opinion, the manuscript got substantially improved and provides now all the necessary information for the readers to follow your approach and the interpretations. I only suggest some additional minor technical revisions, like better labeling the figures (orientation of profiles, e.g., NW & SE) and explaining all the abbreviations also in figure captions. Some very minor comments and suggestions you will find in the annotated manuscript.

Maybe you could add a statement somewhere, if or not information on seismic velocities are available for the (lower) oceanic crust. It would be great if you could better document the tests (e.g., with constant susceptibility in the lower crust), for instance, adding also a cross section in the appendix.

With best regards, Wolfram Geissler

Dear Wolfram Geissler,

thank you for your second review of the manuscript. We appreciate that you see a substantial improvement of the manuscript. We mainly followed the technical revisions you suggested with the only exception that we do not explicitly explain abbreviations in the figure caption, when they have been introduced to the text before. Here, we refer to the submission guidelines of the journal:

Figure captions: "...The abbreviations used in the figure must be defined, unless they are common abbreviations or have already been defined in the text"

Beyond that, we state that indeed there is seismic velocity in the lower crust available. Furthermore, we restructured the Appendix and added another figure and table that documents the different approaches to invert for lateral susceptibility variation. As you suggested, we focus this schematic figure on cross section 5. Figure A3 in the Appendix has been updated and is now Figure A2.2. We want to state that we rearranged the subplots of the figure. Particularly, the inverted susceptibility of the upper crust is now updated, as in the previous version of the manuscript a wrong color bar was applied. The interpretation, however, holds as before. But we want to thank again the reviewer for pointing out the relevance of this figure.