Response letter to RC1

We would like to greatly appreciate the comments and suggestions made by referee 1, Dr. Wolfgang Siebel, that increased the scientific quality of the manuscript. Below are our replies to Dr. Siebel comments.

Comments made in the manuscript pdf

Comment 1, line 63
"Justification"

Response from authors:
We have reorganized this sentence to include the most important pieces of evidence for widespread faulting and HT/LP metamorphism during the late stages of the Variscan Orogeny (e.g., the presence of large igneous domains and the complex juxtaposition of high- and low-grade metamorphic domains).

Comment 2, line 79
"igneous rocks"

Response from authors:
Changed accordingly.

Comment 3, line 85
"it should be mentioned that this area also contains remnants of a recently identified island arc (Propach et al. 2008)"

Response from authors:
We added a description regarding these findings.

Comment 4, line 127
"phrasing
better: structural pattern"

Response from authors:
Changed accordingly.

Comment 6, line 210
"note, the southeastern part of this domain almost exclusively consist of igneous rocks: Hauzenberg, Fürstenstein and orthoanatexite complex in between. So, this part differs completely from the remainder of A1"

Response from authors:
As there are several comments on this topic (subdivision of domain A), we provide a detailed response at the end of this response letter (below comment 2 of "Specific remarks not made in the manuscript pdf", which heads in the same direction).

Comment 7, lines 223-224
"as mentioned above this part almost entirely consist of igneous and metamorphosed igneous rocks (would make sense to separate this part from domain A)"

Response from authors:
Please see our response to comment 6. We provide a detailed response at the end of this response letter (below comment 2 of "Specific remarks not made in the manuscript pdf", which heads in the same direction).

Comment 8, Figure 3
"between FST and HZB is a large orthoanatexite terrane (see Propach et al. 2008), Siebel et al. 2012) reminiscent to the palites and without relation to the metasedimentary rocks (diatexites, gneisses) of unit A1"

Response from authors:
Please see our response to comment 6. We provide a detailed response at the end of this response letter (below comment 2 of "Specific remarks not made in the manuscript pdf", which heads in the same direction).

Comment 9, line 245
"cordierite plays an important role in these rocks. Part ot the metatextic rocks contain more than 20 % cordierite! Please add this point"

Response from authors:
We added this point.

Comment 10, line 247
"C into C1 and C2 ? (because here you are discussing domain C"

Response from authors:
Here, we intend to emphasize that the NNW extension of the boundary subdividing A into A1/A2 also forms the boundary line between C1 and C2. We clarified this explanation in the revised text.

Comment 11, line 256
"this is seen also in fig. 15 of Schaarschmidt et al. (2019). Please add this reference"

Response from authors:
We added this reference.

Comment 12, lines 291-292
"this observation supports the special status of this igneous subdomain and would justify its separation from domain A sensu stricto (see comments above)"

Response from authors:
Please see our response to comment 6. We provide a detailed response at the end of this response letter (below comment 2 of "Specific remarks not made in the manuscript pdf", which heads in the same direction).

Comment 13, lines 326-327
"by now, ridge remnants are only left at two sides that escaped the quartz mining: quartz reefs at Viechtach and Regen

Response from authors:
We agree that distinct, steep quartz reefs are only left at Viechtach and Regen. Nevertheless, many other segments of the Pfahl Shear Zone are still visible as, although subtle, ridges in topography, which might be due to the remnant quartz mineralization in the subsurface.

Comment 14, line 383
"you should say that the lineaments were recognized based on topographic feature analyses and not on field mapping (see also line 479)"

Response from authors:
We clarified this.

Comment 15, Figure 9
"why not shown full rose diagrams for the different domains such as in figure 8. I guess this would be more legible"

Response from authors:
We now show full rose diagrams in the revised manuscript.

Comment 16, Figure 9
"looks that this subfigure presents the same data as figure 8a - so this plot is redundant"

Response from authors:
We have merged figures 8 and 9 to avoid redundancy.

Comment 17, line 389
"detected"

Response from authors:
Changed accordingly.

Comment 17, Figure 10
"Naeser (in Gebauer, 1984)?"

Response from authors:
The ages were first precisely mentioned in Wagner et al. (1989), which is why we give this reference. In contrast, ZFT data, which have also been measured by Naeser, have already been mentioned in Gebauer (1984).

Comment 18, line 433
"odd phrasing - please replace this term by e.g., progenitor / source material or else"

Response from authors:
Changed in "progenitor".

Comment 19, lines 470-471
"unclear sentences"

Response from authors:
With this sentence, we intend to highlight the special lithological character of the area in between the Patersdorf Stock and the Metten Massif (or in between the Cham Fault and the Fürstenstein Composite Massif, respectively). Unlike the northwestern and southeastern parts of domain A, this central part is not only formed by diatexites but also contains intercalations of gneissic rocks, which we interpret as remnants that escaped anatectic overprint. Together with the fact that granites in this part of domain A occur exclusively along the major shear zones (e.g., Patersdorf Stock and Metten Massif), this points to a lower amount of exhumation and a westward directed tilt of the domains A1, B, and C1. We clarified this explanation.

Comment 20, lines 474-475
"why should this be the case?"

Response from authors:
We agree that this conclusion might appear a little overinterpreted. Nevertheless, the spatial correlation between higher-grade metamorphic rocks (i.e., diatexites) correlating with lowered topography and lower-grade metamorphic rocks (i.e., gneisses) generally correlating with higher elevations is evident (c.f., Fig. 5 b and c). We therefore adjusted this sentence so that it only gives indications for the above-mentioned relationship.

Comment 21, Figure 12
"meaning of "P" and "R" needs to be explained"

Response from authors:
We added this explanation to the figure caption.

Comment 22, line 515
"be more precise, what ages do you mean? ZFT or AFT or both?"

Response from authors:
Here, we mean both types of FT ages. We clarified this part.

Comment 23, line 548
"unclear statement: restricted exposure could also mean in limited quantity. I guess you want to say than granites mainly occur west of the Chan fault, e.g., in the Regensburger Wald and in the southern Oberpfälzer Wald. Please make it more clear."

Response from authors:
Indeed, here we want to say that granites mainly occur west of the Cham Fault. We clarified this part.

In addition to the above listed comments, we corrected all technical errors mentioned in the manuscript pdf (lines 331, 495, 504, 510, 512, 548, 559 …)

Specific remarks not made in the manuscript pdf

Comment 1
"A Bouguer anomaly map was already published and discussed by Schaarschmidt et al. (2019 Figure 15). Their figure shows clear differences in gravity anomaly between the Vorderer and Hinterer Bayerischer Wald and areas of granite accumulations and such previous results should be adequately mentioned in the present manuscript."

Response from authors:
We now refer to previous results of Schaarschmidt et al. (2019) when describing the different gravity signatures of the "Vorderer Bayerischer Wald" (domain A) and the "Hinterer Bayerischer Wald" (domain B and C). Schaarschmidt et al. (2019) presented preliminary results based on a qualitative discussion of the observed, unfiltered Bouguer anomalies; we applied a high-pass filtering technique and have a stronger focus on the detection of buried granite bodies. The gravity map shown in Schaarschmidt et al. (2019) depicts gravity anomalies of the entire crust and, therefore, it reflects superimposed gravity signatures of different crustal units at various depths. The short-wavelength part of the filtered anomaly, as used in our study, generally better correlates with (near-)surface geology. Hence, an unfiltered gravity map does not differentiate between the signature of rock units located at different crustal depths nor between lower density rocks, e.g., granites and sedimentary rocks

Comment 2
"At line 85 and for reconsidering the subdivision of domain A (see comments in pdf file), the following reference should be considered more strongly: Propach G, Kling M, Lindhardt E, Rohrmüller J (2008) Remnants of an island arc within the Moldanubian zone of the Bavarian Forest. Geologica Bavarica 110: 343–377"

Response from authors:
Thank you very much for your suggestion to reconsider the subdivision of domain A. In this paper, we aim to relate the lithological expression of the southwestern Bohemian Massif to its structural architecture, therefore we only have included bounding structures that are presumably of tectonic origin (e.g., curvilinear to linear boundaries, such as the Pfahl Shear Zone and the inferred Cham Fault). In the case of the southeastern part of domain A, we could not define such a distinct boundary. Identified domains are fault-bounded lithological units, while in the southeastern part of domain A no fault could be interpreted based on geological maps and presented lineament analysis, hence we interpret the southeastern part of domain A as a lithologically different portion of the same domain.

The mentioned reference of Propach et al. (2008) indeed highlights the special status of the southeastern part of domain A. However, from the current metamorphic expression of domain A, it rather appears as a gradual transition from diatexites with intercalated gneissic rocks (see reply to comment 19) and fault-restricted granites in the central part of domain A to homogenous ortho-diatexites and extensively exposed granites in the southeast.

The transition between high topography in the central part of domain A and lowered topography in the southeast appears to be rather gradual and does not correlate with a single distinct topographic lineament. Instead, the transition from high to low elevations appears to be closely linked to the occurrence of granites and ortho-anatexites in between the Fürstenstein and Hauzenberg composite massifs. This suggesets that the topographic expression in this part of the study area is rather a result of varying rock erodabilities that appear to depend on the metamorphic grade of the exposed rock units (c.f., comment 20). From the filtered Bouguer anomaly map (Fig. 4 c and d), domain A1 is defined by the same

pattern of alternating high and low gravity signals throughout its entire extent, pointing towards a similar metamorphic configuration in the subsurface. This contrasts to domain A2, which is characterized by a much lower amplitude in the filtered gravity signal.

Consistent Fission-Track ages in domain A further support our view that a km-scale tectonic structure separating the southeastern part of domain A from the rest is most likely missing.

Nevertheless, we agree that this interpretation might be less comprehensible compared to the interpretation of the Cham Fault. Therefore, we added a paragraph explaining why we decided not to include another domain in this part of the study area. We have also replaced the term "lithological domain" with "fault-bounded lithological domain" to clarify its definition.

References

Gebauer, D.: Erdgeschichtliche Entwicklung und geologischer Überblick, in: Erl. Geol. Kt. Bayern 1:25.000, Bl. 7446 Passau, edited by: Bauberger, W. and Unger, H. J., München, 13–22, 1984.

Propach, G., Kling, M., Linhardt, E., and Rohrmüller, J.: Remnants of an island arc within the Moldanubian zone of the Bavarian Forest, in: Geologica Bavarica Nr. 110: Geochronologische, geochemische, petrographische und mineralogische Untersuchungen im Grundgebirge Bayerns sowie kritische Betrachtungen zu Sr-Isotopenstandards, edited by: Bayerisches Landesamt für Umwelt, Augsburg, 343–377, 2008.

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Wagner, G. A., Michalski, I., and Zaun, P.: Apatite Fission Track Dating of the Central European Basement. Postvariscan Thermo-Tectonic Evolution, in: The German continental deep drilling program (KTB): Site selection studies in the Oberpfalz and Schwarzwald, edited by: Emmermann, R., Springer, Berlin, Heidelberg, New York, London, Paris, Tokyo, Hong Kong, 481–500, 1989.