TEKTONIKA

Review Report

Fazlikhani et al., The Saxo-Thuringian Basin of the Central European Variscides: Subsurface Characterization of a Lateral Foreland Basin Based on an Integrated Geophysical Data Set, TEKTONIKA, 2025.

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1st Round of Revisions

Decision Letter

The paper entitled “The Saxo-Thuringian Basin of the Central European Variscides: development of a syncollisional-margin basin; based on integrated geophysical data set” has been reviewed by two reviewers. They suggest that the topic is very interesting and the complementarity of geophysical data is impressive, but the method is incomplete. The authors named a new type of basin (syncollisional margin basin instead of foreland basin) but support for this argument is insufficient. In addition, the authors are encouraged to provide an analysis of the detritus provenance to constrain the geodynamic reconstruction. The results and discussion have to be separated. The discussion could be further elaborated to include alternative interpretation of Variscan shear zone and its comparison to other basin provinces of similar tectonic setting. Based on the these comments, we suggest a major revision for this MS.

Comments by Reviewer 1

Comments by Reviewer A (Wolfram Geissler) and author response

Section A: Overview of manuscript

This study presents the geometry of the Saxo-Thuringian Basin determined by two 2D forward gravity modelling profiles constrained by seismic reflection profiles and well data. Based on these 2D gravity modelling, they define a new type of basin following from a geodynamic reconstruction. The amount and the complementarity of geophysical data are impressive, but the data are finally a bit underexploited.

The magnetic anomaly map is used just to assume the possible extent of the basin, based on the extent of magnetic lows, while it may provide much more information based on the correlation between the magnetic signal and the lithologies. I think this map could better contribute to the characterization of the crust and therefore the SXB.

Moreover, it is difficult for the reader to make a clear correlation between the lithologies of the wells and the final gravity models. This may be solved by adding the details of the wells on the gravity profiles.

In addition, I do not understand the argument why the sedimentary deposits necessary came from the uplifted collisional pile in the SE of the SXB and not also from the folding and thrusting basement rocks in the NW. The authors should present an analysis of detritus provenance based on U-Pb ages and Hf isotopic signature from metasedimentary rocks to strengthen this argument.

Finally, why is there the absolute need to define a new type of basin instead of keeping the term “foreland”? I understand that it might be because of the NW-SE convergence vs. the NE-SW strike-slip plate-boundary scenario, but is it a necessary and adequate argument? If the authors are convinced about the need of this new basin definition, they should provide stronger arguments.

I think the topic is very interesting, the geophysical data of good quality, but the method is incomplete. I would recommend this study for publication after these problems are addressed and the arguments strengthened because characterizing the geometry of the basin and analysing its location in the frame of the Variscan Belt is not a necessary and adequate argument for concluding to a new type of basin.

I suggest to add at least an analysis of the detritus provenance to better prove the origin of the sedimentary deposits.

The main result of this study is the two 2D gravity modelling profiles constrained by seismic reflection profiles, which show the geometry of the basin. Determining the geometry is not enough to build a geodynamic model. Complementary datasets, such as detritus provenance may lead to a constrained geodynamic reconstruction.

I would also try better explain why the term “syncollisional marginal basin” is better than the classic “foreland basin”. This is still not clear to me.

Some text will have to be added for the description and analysis of detritus provenance.

On the contrary, the last paragraph of the discussion/conclusion can be deleted, as it does not bring any additional information and may be even irrelevant for the study to me.

Section B: Detailed evaluation of manuscript

The abstract should be reworked in several aspects:

As there is one sentence about the interpretation of the observed gravity, one sentence should be written on the interpretation of the magnetic anomalies, seismic and well data. If not, then I would remove the sentence on the observed gravity anomalies for a coherency of the abstract's structure. However, it will impoverish the content of the abstract. Maybe this is due to the underexploitation of the magnetic and well data in general in this study. The last sentence of the abstract should be developed in order to strengthen and better explain the argument: Why this basin cannot be a foreland basin?

B3) Data and methods

I would present in this section graphs of detrital provenance.

I am not sure if the data used are accessible in the frame of the journal policy. For sure, the gravity and magnetic map or not useable in their current forms (JPEG files), the grids are necessary to ensure the reproducibility of the study.

B4) Results

I would put the analyses and the interpretations of the gravity and magnetic anomaly maps before the forward modeling results to show that part of the modeling results is based on the analysis of the potential field maps.

B5) Discussion and conclusions

Discussion and conclusion are merged. However, I would be cautious regarding some assertions that seem not enough supported by the data and the results as they are now. Please see the comments in the section A of this review form.

A specific comment concerning the sentence from lines 407 to 409: “Because the transform plate boundary in the NW (future MGCZ and the NW-WTZ) did not significantly contribute to the basin infill, the SXB was exclusively supplied in detritus from the collisional pile (equivalent of the Erzgebirge-Fichtelgebirge Zone) in the SE.” How do you prove that the SXB was exclusively supplied in detritus from collisional pile? Any detrital provenance analysis that show it? And why this assertion is a necessary and sufficient condition to define a new type of basin?

B6) Figures, tables and citations

The figure captions are very long and can be shortened. There is often no titles for the figures.

In general the size of the fonts are too small and are hardly readable. Please increase the fonts in all figures.

Fig.1: In the legend the red color for the granites is missing in order to better distinguish those that outcrops from those in the wells.

The colors of the different lithologies are often too similar from each other. It is hard to distinguish for example between the blues, greens and pinks (Cadomian basement and Late Carboniferous-Permian are too close for example, same for recycled upper crust, Proximal turbidites and Jurassic, etc, etc)

It is confusing to use circles to locate the towns and the wells. Please use for example cross or triangle to locate the towns.

Fig. 2: A lot of colors are not explain in the legend: the dark green, the beige, the blue in the center of the basin on the D. Please check carefully.

Figs. 3-4-7-8: Please put the equivalent of depth on the Y axis opposite to TWT axis. It is easier to get an information concerning the depth of the profiles.

Fig. 8: the length of the profile or a scale is missing for the panel E.

Fig. 9: the time periods for A and B are missing.

Section C: Additional comments

In general change “lower Carboniferous” by “Lower Carboniferous”.

Comments by Reviewer 2

Comments by Reviewer B (anonymous) and author response

Section A: Overview of manuscript

Results and Interpretation/Discussion has to be separated. Interpretation and schematic sketch could be more elaborated.

Add uninterpreted seismic reflection sections as appendix/suppl. material.

Section B: Detailed evaluation of manuscript

It is not clear to me, if the reprocessing of the seismic reflection data was part of this study or of a previous study. If it was part of this study, the more details on the reprocessing have to be presented.

The data is in principle accessible at various institutions. Maybe the authors could give more details on contacts or procedures how to access these data sets.

In my opinion, the results should be presented with less interpretation (some might be necessary already at the results stage) but definitely without discussion. The authors should first describe the seismic sections, and at a later stage interpret them.

The discussion could be further elaborated, e.g., are the alternative interpretations for the Variscan shear zones underlying the metasedimentary rocks? Are shear zones penetrated by wells? Maybe the authors could compare the deep seismic reflection and well data with other regions, like for instance Scandinavia? The reflectivity of different facies and shear zones (interpretations) could be discussed/introduced in more detail.

The discussion/interpretation of the potential field data should be formulated more scientific.

Sometimes it is not fully clear, if statements are based on own results or references.

In the discussion I miss the larger tectonic context. What are the roles of fault zones shown in figure 9, are this true boundary fault zones between (micro)plates/terranes? What is the role of the SE thrust fault zone? Could topography be added in the schematic cross-sections?

What means “distal” and “proximal”, what the interpretation is based on, e.g., grain size?

Could the tectonic setting be similar to recent settings in the SW Pacific realm (north of Australia)?

The subchapter “An integrated methodology for subsurface characterization” comes a bit unmotivated. There was nothing about it in the Introduction section. Also, other parts were not really introduce before (see lines 488 to 492).

There are not really standalone conclusions.

Uninterpreted seismic reflection sections should be presented as appendix.

Where appropriate KTB location should be added on maps.

Section C: Additional comments

Use less abbreviations if possible.

The Mid-German Crystalline Rise could be introduced (or discussed) in a bit more detail. It is not clear to me, how more recent interpretations support your ideas.

Authors' Reply to Reviewer 1

Comments by Reviewer A (Wolfram Geissler) and author response

We would like to thank the reviewer Dr. Geissler for constructive and positive comments. We have revised and partly rewritten the manuscript accordingly.

Section A: Overview of manuscript

This study presents the geometry of the Saxo-Thuringian Basin determined by two 2D forward gravity modelling profiles constrained by seismic reflection profiles and well data. Based on these 2D gravity modelling, they define a new type of basin following from a geodynamic reconstruction. The amount and the complementarity of geophysical data are impressive, but the data are finally a bit underexploited.

The magnetic anomaly map is used just to assume the possible extent of the basin, based on the extent of magnetic lows, while it may provide much more information based on the correlation between the magnetic signal and the lithologies. I think this map could better contribute to the characterization of the crust and therefore the SXB.

We agree that the presented magnetic anomaly map provides much more information. The correlation of the magnetic anomalies with the exposed rocks aiming to propose the lateral extension of the NW Saxo-Thuringian Zone is the objective of a second publication under internal review. Including the interpretation of the magnetic map with the applied filtering results and the associated methodology and discussion in this current publication would make it a lengthy publication.

Moreover, it is difficult for the reader to make a clear correlation between the lithologies of the wells and the final gravity models. This may be solved by adding the details of the wells on the gravity profiles.

We have included a new table (Table 3) listing the stratigraphical units and thickness encountered in wells associated with gravity models.

In addition, I do not understand the argument why the sedimentary deposits necessary came from the uplifted collisional pile in the SE of the SXB and not also from the folding and thrusting basement rocks in the NW. The authors should present an analysis of detritus provenance based on U-Pb ages and Hf

isotopic signature from metasedimentary rocks to strengthen this argument.

The lack of sedimentary deposits sourced from the NW is based on the published sedimentary facies and paleoenvironmental analyses cited in the text (we have added more citations in the revised version). In addition, Linnemann et al. 2024 published U-Pb ages obtained from detrital and magmatic zircons farther N (Harz Mountain) and argue that the exhumation of the MGCZ rocks, and thus the detrital input increases during the Visean-Serpukhvian. This is the time interval when the STB is already overfilled.

Finally, why is there the absolute need to define a new type of basin instead of keeping the term “foreland”? I understand that it might be because of the NW-SE convergence vs. the NE-SW strike-slip plate-boundary scenario, but is it a necessary and adequate argument? If the authors are convinced about the need of this new basin definition, they should provide stronger arguments.

We are grateful to Dr. Geissler for this comment. The STB shows a special basin type, where not all elements of the basin fit into the classical flexural foreland basin. Sedimentation occurred in a strike-slip dominated part of the plate boundary zone, and the basin boundaries are characterized by strike-slip faulting. One of these faults is the boundary fault to the collisional wedge. No initial flexure occurs and the axis of this narrow basin is parallel or acute-angled to the convergence direction during the collision. However, there are also similarities to the flexural foreland basin. For example, the southeastern boundary of the STB is adjacent to the thickened collision zone, and the uplifting collisional wedge delivered the basin with detritus. Moreover, the transition from distal to proximal sediments changed in time from SE to NW. Therefore, we decided to use “lateral foreland basin” instead of “syncollisional-marginal basin”. Please see rewritten chapter in the discussion.

I think the topic is very interesting, the geophysical data of good quality, but the method is incomplete. I would recommend this study for publication after these problems are addressed and the arguments strengthened because characterizing the geometry of the basin and analysing its location in the frame of the Variscan Belt is not a necessary and adequate argument for concluding to a new type of basin.

I suggest to add at least an analysis of the detritus provenance to better prove the origin of the sedimentary deposits.

Please see the reply above.

The main result of this study is the two 2D gravity modelling profiles constrained by seismic reflection

profiles, which show the geometry of the basin. Determining the geometry is not enough to build a geodynamic model. Complementary datasets, such as detritus provenance may lead to a constrained geodynamic reconstruction.

Previously, the geometry of the basin was described only on the basis of the exposed portion of the basin, which led to the proposition of a subcylindrical tectonic model for the Saxo-Thuringian Zone. With presenting the geometry of the SW portion of the basin, we show that subcylindrical tectonic model does not apply to the studied part of the Variscan belt. Therefore, integrating our results with published studies analyzing sedimentary facies, structural and metamorphic evolution, we propose a geodynamic model for the NW Saxo-Thuringian Zone.

I would also try better explain why the term “syncollisional marginal basin” is better than the classic “foreland basin”. This is still not clear to me.

Please see the reply above and rewritten chapter in the discussion.

Some text will have to be added for the description and analysis of detritus provenance.

Please see the reply above.

On the contrary, the last paragraph of the discussion/conclusion can be deleted, as it does not bring any additional information and may be even irrelevant for the study to me.

In our study we aim to characterize the subsurface of the areas to the west of the Bohemian Massif. We believe that the results of the presented integrated study have implications for both Variscan tectonics and subsurface characterization. We have revised the abstract and the introduction better reflecting the last paragraph of the discussion.

Section B: Detailed evaluation of manuscript

The abstract should be reworked in several aspects:

As there is one sentence about the interpretation of the observed gravity, one sentence should be written on the interpretation of the magnetic anomalies, seismic and well data. If not, then I would remove the sentence on the observed gravity anomalies for a coherency of the abstract's structure. However, it will

impoverish the content of the abstract. Maybe this is due to the underexploitation of the magnetic and well data in general in this study. The last sentence of the abstract should be developed in order to strengthen and better explain the argument: Why this basin cannot be a foreland basin?

In the rewritten abstract, we have included sentences regarding the seismic facies, magnetic field signature, and wells as suggested. We decided to use “lateral foreland” basin instead of “syncollisional-marginal” basin and revised the last sentence of the abstract accordingly.

B3) Data and methods

I would present in this section graphs of detrital provenance.

Please see the reply above.

I am not sure if the data used are accessible in the frame of the journal policy. For sure, the gravity and magnetic map or not useable in their current forms (JPEG files), the grids are necessary to ensure the reproducibility of the study.

Lithological units boundaries, fault traces and well data are available via the Geological Survey of Bavaria (Bayerisches Landesamt für Umwelt – LfU) website at: https://www.umweltatlas.bayern.de. Bouguer gravity anomaly and total magnetic field intensity grids are available from the LIAG Institute for Applied Geophysics (Institut für Angewandte Geophysik). Original DEKORP seismic reflection survey is available from the GFZ (Deutsches GeoForschungsZentrum) Potsdam upon request. FRANKEN seismic data were acquired for the ongoing Geothermal Alliance Bavaria (GAB) research project and are not yet publicly available.

B4) Results

I would put the analyses and the interpretations of the gravity and magnetic anomaly maps before the forward modeling results to show that part of the modeling results is based on the analysis of the potential field maps.

Thank you for the suggestion. The results part of the manuscript begins with the analysis of seismic reflection and well data, through the description and interpretation of total magnetic field intensity and Bouguer gravity anomaly maps, before presenting the forward modeling results.

B5) Discussion and conclusions

Discussion and conclusion are merged. However, I would be cautious regarding some assertions that seem not enough supported by the data and the results as they are now. Please see the comments in the section A of this review form.

A specific comment concerning the sentence from lines 407 to 409: “Because the transform plate boundary in the NW (future MGCZ and the NW-WTZ) did not significantly contribute to the basin infill, the SXB was exclusively supplied in detritus from the collisional pile (equivalent of the Erzgebirge-Fichtelgebirge Zone) in the SE.” How do you prove that the SXB was exclusively supplied in detritus from collisional pile? Any detrital provenance analysis that show it? And why this assertion is a necessary and sufficient condition to define a new type of basin?

We have rewritten the mentioned chapter in the discussion and now use the term “lateral foreland basin” instead of the “syncollisional-marginal” basin, please see also the reply above. The definition of the STB as a lateral foreland basin is based on the peculiar position of the basin, which is formed in the upper plate (continental crust) in a marginal position between a transform plate boundary in the NW and the lateral edge of the orogenic pile in the SE (Bohemian Massif). Such a spatial position is different from a flexural foreland basin developing in front of an advancing orogenic pile (here NW advancement of the Variscan orogenic pile), because syn-orogenic turbidites are onlapping into an already deformed shelf facies in a top-to-the SW tectonic transport. The SE-provenance of the detritus as the main source of the basin fill and the absence of detritus from the NW is based on the published works analyzing the sedimentary facies and depositional environment referenced in the text.

B6) Figures, tables and citations

The figure captions are very long and can be shortened. There is often no titles for the figures.

We agree that the figure captions are long because some of the figures have abbreviations that need clarification. Figure captions are shortened as much as possible.

In general the size of the fonts are too small and are hardly readable. Please increase the fonts in all figures.

Figures are modified accordingly.

Fig.1: In the legend the red color for the granites is missing in order to better distinguish those that outcrops from those in the wells.

The colors of the different lithologies are often too similar from each other. It is hard to distinguish for example between the blues, greens and pinks (Cadomian basement and Late Carboniferous-Permian are too close for example, same for recycled upper crust, Proximal turbidites and Jurassic, etc, etc)

It is confusing to use circles to locate the towns and the wells. Please use for example cross or triangle to locate the towns.

Fig. 2: A lot of colors are not explain in the legend: the dark green, the beige, the blue in the center of the basin on the D. Please check carefully.

Figs. 3-4-7-8: Please put the equivalent of depth on the Y axis opposite to TWT axis. It is easier to get an information concerning the depth of the profiles.

Fig. 8: the length of the profile or a scale is missing for the panel E.

All of the above comments have been implemented and figures are modified.

Fig. 9: the time periods for A and B are missing.

The simplified cartoons in Figs. 9A and 9B are a more generic representation of basin evolution. If applied only to the study area, Fig. 9A would represent ca. >340 Ma, when the basin accommodates erosional products of the advancing orogenic pile, and Fig. 9B would represent ca. <340 Ma, when the basin is overfilled and erosional products are stored in the Rheno-Hercynian Basin, farther NW.

Section C: Additional comments

In general change “lower Carboniferous” by “Lower Carboniferous”.

Since the term “lower” is not an official series/epoch in the Carboniferous time, we prefer to use the “lower Carboniferous” instead of the “Lower Carboniferous.

Authors' Reply to Reviewer 2

Comments by Reviewer B (anonymous) and author response

We would like to thank the anonymous reviewer for constructive and positive comments. We have revised and partly rewritten the manuscript accordingly.

Section A: Overview of manuscript

Results and Interpretation/Discussion has to be separated. Interpretation and schematic sketch could be more elaborated.

The Results chapter is now titled "Interpretation and modeling results" for clarity. We have also separated the "Discussion and conclusion" chapter and added a separate "Conclusion" chapter in the revised manuscript.

Add uninterpreted seismic reflection sections as appendix/suppl. material.

Uninterpreted seismic profiles are added into the appendix.

Section B: Detailed evaluation of manuscript

It is not clear to me, if the reprocessing of the seismic reflection data was part of this study or of a previous study. If it was part of this study, the more details on the reprocessing have to be presented.

This current publication and the reprocessing of vintage DEKORP profiles (also shown in Fazlikhani et al. 2022) are part of the ongoing the Geothermal-Alliance Bavaria project. The following reprocessing steps are applied:

Pre-stack processing: geometry checking, amplitude recovery, field and residual statics, anomalous amplitude attenuation, recording polarity, velocities – residual statics – mute, radon filtering and random noise attenuation, deconvolution, post-stack time migration, post-stack depth migration, pre-stack time migration, band-pass filtering, pre-stack depth migration, radon filtering.

Stacking: post-stack processes, coherency enhancement, amplitude control.

The data is in principle accessible at various institutions. Maybe the authors could give more details on

contacts or procedures how to access these data sets.

Lithological units boundaries, fault traces and well data are available via the Geological Survey of Bavaria (Bayerisches Landesamt für Umwelt – LfU) website at: https://www.umweltatlas.bayern.de. Bouguer gravity anomaly and total magnetic field intensity grids are available from the LIAG Institute for Applied Geophysics. Original DEKORP seismic reflection survey is available from the GFZ (Deutsches GeoForschungsZentrum) Potsdam upon request.

In my opinion, the results should be presented with less interpretation (some might be necessary already at the results stage) but definitely without discussion. The authors should first describe the seismic sections, and at a later stage interpret them.

We have revised the “Interpretation and modeling results” chapter with additional description of the seismic facies and related references. Since a detailed description of the seismic facies has already been published by the authors, we would like to refer the readers to Fazlikhani et al. 2022. Discussion-oriented parts of the text have been moved to the discussion chapter.

The discussion could be further elaborated, e.g., are the alternative interpretations for the Variscan shear zones underlying the metasedimentary rocks? Are shear zones penetrated by wells? Maybe the authors could compare the deep seismic reflection and well data with other regions, like for instance Scandinavia? The reflectivity of different facies and shear zones (interpretations) could be discussed/introduced in more detail.

One of the advantages of our data set is that the DEKORP 90 profile images exposed basement units, including the shear zones, that can be directly related to the high amplitude and continuous reflections. These shear zones developed at various depths, involved nappe units, and accommodated different amounts of strain. Further west, the same profile images the Franconian Platform, where the same basement units (assuming that the Variscan units extend SW across the Franconian fault system) are covered by Permian and Mesozoic sedimentary rocks. This profile is then tied to the FRANKEN seismic survey and basement drilled wells in the area to provide a better geological interpretation of the seismic profiles. In addition, Ritter et al. 1999 conducted a magnetotelluric survey across the Münchberg Nappe, and concluded that the zone of high electrical conductivity below the nappe units is related to the horizontal transport process along the basal shear zones, which correlates with the observed high amplitude

reflections along the DEKORP85-4N profile.

In addition, as the reviewer pointed out, there are many published studies around the world (e.g. Scandinavia, including the authors' earlier works) that interpret high amplitude reflections mainly as shear zones in an onshore-offshore setting. We have added some references in the revised manuscript.

The discussion/interpretation of the potential field data should be formulated more scientific.

The interpretation and results of modeling chapter and the discussion chapter are revised in the new submission.

Sometimes it is not fully clear, if statements are based on own results or references.

We have added additional references where appropriate.

In the discussion I miss the larger tectonic context. What are the roles of fault zones shown in figure 9, are this true boundary fault zones between (micro)plates/terranes? What is the role of the SE thrust fault zone? Could topography be added in the schematic cross-sections?

The fault zone shown in the NW of the Figure 9, defines a plate boundary zone, a highly deformed area consisting of major strike-slip fault zone. This plate boundary zone would represent the boundary between the Gondwana and Laurussia plates with a sinistral sense of movement. Strike-slip structures within this highly deformed plate boundary zone reactivate as thrusts in the latest stages of the Variscan tectonics such as the Blumenau thrust or the thrust fault along the Vesser zone. The timing and magnitude of the thrust faulting varies between structures, causing differential uplift and exhumation of the different crustal levels along the Mid. German Crystalline Zone and the NW areas of the Saxo-Thuringian Zone (the Northwest Wrench and Thrust Zone, sensu Kroner et al. 2007). Similarly, the southeastern boundary of the STB is defined by sinistral strike-slip fault zones that facilitated the NW advancement of the orogenic pile during late stages of the orogeny. In the study area, the SE boundary strike-slip and thrust zone would represent the boundary between the Saxo-Thuringian and the Moldanubian zones.

What means "distal" and "proximal", what the interpretation is based on, e.g., grain size?

Distal and proximal (shelf facies and turbidites) refer to the distance at which sediments are deposited from the source area. Thus, distal refers to finer grained and well sorted sediments as opposed to proximal sediments.

Could the tectonic setting be similar to recent settings in the SW Pacific realm (north of Australia)?

The example of the SW Pacific (north of Australia and Papua New Guinea) shows some similarities with the study area. The main difference, however, is the absence of a crustal strike-slip scale shear zone bounding the basin in its present configuration.

The subchapter “An integrated methodology for subsurface characterization” comes a bit unmotivated. There was nothing about it in the Introduction section. Also, other parts were not really introduce before (see lines 488 to 492).

We have revised the abstract and introduction to better justify the subsurface characterization subchapter. In our study we aim to characterize the subsurface of the areas to the west of the Bohemian Massif. We believe that the results of the presented integrated study have implications for both Variscan tectonics and subsurface characterization.

There are not really standalone conclusions.

We have added conclusions in the revised version.

Uninterpreted seismic reflection sections should be presented as appendix.

Uninterpreted seismic profiles are added into the appendix.

Where appropriate KTB location should be added on maps.

KTB location is added in the instead map in figures 1, 5 and 6.

Section C: Additional comments

Use less abbreviations if possible.

We have revised the manuscript accordingly.

The Mid-German Crystalline Rise could be introduced (or discussed) in a bit more detail. It is not clear to me, how more recent interpretations support your ideas.

We have included a relevant and brief introduction to the Mid German Crystalline Zone in the geological setting. We would appreciate it if reviewer could provide more information on the “recent interpretation”,

as the relationship between the Mid-German Crystalline Zone and the Saxo-Thuringian Zone is the focus of another ongoing manuscript.

2nd Round of Revisions

Decision Letter

The revised version of the paper has been reviewed by Dr. Wolfram Geissler and one anonymous reviewer. The comments provided by these reviewers are very favorable and are suggested for acceptance after minor corrections. Minor issues including grammatical, spelling, typo, and font size in the figures need to be fixed. Details of the comments are listed either in the reviewer comment files or annotated in the manuscript. In general, I agree with the reviewers that this revised manuscript has been significantly improved and has satisfied the standard for publication in Tektonika after minor editing.

Comments by Reviewer 1

Dear authors,

thank you very much for your response to my comments, questions and suggestions, and all the revisions you made to the manuscript. In my opinion, the manuscript reads now very good.

There are only very minor things to check and potentially correct. I suggest that could be done within the proof reading process.

e.g., Line 23, areas --> area

Lines 89/90, not a complete sentence yet

Line 122 and following, Mid. German --> Mid-German

Lines 186-188, that sentence does not fit into the subchapter

Line 248, is --> had / had been?

Line 284, extends --> extend

Line 346, transparent - seismic - reflectivity / or better: seismic transparency

(Line 540, grid --> network?)

Line 559, and drilled ??? --> is sampled by 7 wells

Line 613, Gerald Gabriel !

Line 614, Manfred Stiller !

Comments by Reviewer 2

The revised manuscript of Fazlikhani et al. was significantly improved.

Overall, they provided the answers requested and reinforced their arguments when necessary.
I still have a doubt, however, about the font sizes, which are probably too small in most of the figures.

Some mistakes in the typo, repetitions and problems with citations remain. I provide an annotated manuscript in PDF format.

Authors' Reply to Reviewer 1

Comments were all accepted and worked on

Authors' Reply to Reviewer 2

The authors would like to thank the anonymous reviewer (third reviewer in the second round od revisions) for their positive comments on the revised version of "The Saxo-Thuringian Basin of the Central European Variscides: subsurface characterization of a lateral foreland basin based on integrated geophysical data set". We have revised the manuscript accordingly.

The following details changes made in the manuscript according to the suggestions made by the anonymous reviewer.

Line 37-38: "This sentence is not necessary and repeat what is better said in the next one". The repetitive sentence is deleted.

Line 40: Last sentence is deleted as it is suggested.

Line 55: "synorogenic" is deleted, avoiding repetition.

Line 64: Cited reference is revised, extra bracket is removed.

Line 77: Cited reference is revised, extra bracket is removed.

Line 78: Cited reference is revised, brackets are added.

Line 88: Comma is added.

Line 89: "Characterized" is modified to "characterized".

Line 108: "of" is removed.

Line 132: Cited reference is modified.

Line 134: "is" added, as suggested.

Line 218: reviewer suggested to add "such", we have decided to reject this suggestion since "early Carboniferous turbiditic units" is our interpretation of transparent and low energy reflections above shear zones.

Line 225-228: "… related to the horizontal transport process along the basal shear zones …" is revised to "… related to the horizontal transport of nappe units along the basal shear zones…"

Line 360-362: Extra brackets are removed.

Line 385: Brackets are added for the cited reference.

Line 439: Required reference are added.

Line 454: Missing “r” is added.

Line 467: “… cross section X” is revised to “… cross section XX’ “.

Line 468: “described” is deleted.

Line 515: “to post-orogenic” is modified.

In addition to the revisions made in the text, we have also updated the inset map in figure 3 (Teuschnitz-Ziegenrück Syncline area), to match figure 1, which is uploaded along with the revised version of the manuscript. We would also like to acknowledge and thank the reviewers and journal editors for their time and effort in reviewing and editing this manuscript.

Kind regards,

Hamed Fazlikhani

Acceptance Letter

Hamed Fazlikhani, Uwe Kroner, Harald Stollhofen, Wolfgang Bauer, Daniel koehn:

We have reached a decision regarding your submission to τεκτονικα, "The Saxo-Thuringian Basin of the Central European Variscides: development of a syncollisional-marginal basin; based on integrated geophysical data set".

Our decision is to: Accept Submission

Kind regards,

Graeme Eagles