

Interactive comment on “Emplacement of “exotic” Zechstein slivers along the inverted Sontra Graben (northern Hessen, Germany): clues from balanced crosssections and geometrical forward modelling” by Jakob Bolz and Jonas Kley

Stanislaw Mazur (Referee)

ndmazur@cyf-kr.edu.pl

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Dear Editors and Authors,

This paper presents implications of detailed map analysis, a semi-quantitative forward model and two balanced cross-sections for the origin of the lens-shaped slivers of Permian (Zechstein) amid Triassic units, appearing along the main boundary fault of the Sontra Graben in central Germany at the southern margin of the Central European Basin System (CEBS). The paper shows how partial reactivation of the Sontra

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Graben and inversion-related shortcut thrusting in the footwall of the main normal fault, combined with a specific geometry of the latter, involving flats in low shear-strength horizons, produced the observed slivers of Zechstein. The kinematic evolution of the Sontra Graben, reconstructed through field observations, structural and cross-section analysis is discussed in the context of the dynamic evolution of the neighbouring part of the CEBS.

This is an interesting and professional contribution combining detailed fieldwork with software-based techniques of modern structural geology. Many positive opinions about the paper are already included in the remaining reviews that I agree with but not going to reiterate. In conclusion, I unequivocally recommend publication of the paper after necessary revision.

I identified a few issues in the manuscript that require attention before publication. They are presented below in the hierarchy of decreasing importance:

1. Referencing of figures. Figures are mis-cited in places (see the annotated manuscript attached for details) and appear in the text not in the order of successive numbering. The latter is partly the effect of mis-citations, but also a general disorder in figures referencing. Furthermore, I think that, besides these minor flaws, an intended succession of figures is not ideal and remains partly inconsistent with the flow of reasoning presented in the paper. Therefore, I suggest rearranging the succession of figures as follows: 1, 2, 3, 4, 7, 9, 10, 5, 8, 6, 11 (using the present numbers).
2. Structure of the manuscript. Geological background is currently included in 'Results'. I understand motivation since drafting a new geological map was part of the project. However, I think that it would be better for clarity to separate sections 3.1 and 3.2 as a chapter 'Geological Setting'. In addition, starting from 'Balanced cross-sections', the division in sub-chapters is too detailed and their numbering is flawed.
3. The scope of the study. This is a regionally oriented study and universal aspects, interesting for the broad readership, are not enough emphasized. Especially, the first

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paragraph of 'Conclusions', describing graben segments, is too detailed and regional for the conclusions. This is probably the place to draw broader implications for inversion tectonics being addressed to researchers interested in this topic.

4. Spelling of chronostratigraphic subdivisions. Formal chronostratigraphic subdivisions as for instance 'Late Triassic' are written with capital letters. However, informal subdivisions as e.g., 'upper Buntsandstein' are written with a small letter (upper). Please consult a web page of the International Commission on Stratigraphy.

I hope that my comments will aid revision of the manuscript and improving its quality.

Best regards

Stanislaw Mazur

Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2020-133/se-2020-133-RC3-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-133>, 2020.