

Comment on **essd-2022-196**

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Community comment on "In situ stress database of the greater Ruhr region (Germany) derived from hydrofracturing tests and borehole logs" by Michal Kruszewski et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-196-CC2>, 2022

Dear Michal and co-authors,

I really enjoyed reading your very interesting article.

My scientific background is geosciences with focus on sedimentary basin modelling. Since a couple of years, one of my favorite topics / hobbies is the understanding of strike-slip tectonics.

The main problem in modelling as well as in our brains is probably that long horizontal distances are hard to imagine and horizontal displacement is not easy to calculate in 3D (most models are based on subsidence).

In this context, what are 1900 m of depth below surface (your studied formation) compared to dozens of km horizontal movements that occurred at the nearby Osning Fault?

What does it mean when your data agrees with the regional stress regime ($S_{\max} = \pm 160$ degrees)? What is the cause for this orientation? Did this stress orientation change over time? What are the major tectonic features in the surrounding?

What I am missing in your analysis / discussion is the regional tectonic context.

In my opinion, this article could be improved a lot by adding aspects like the stress orientation of the Variscan Orogeny and the tectonic features of this tectonic episode (deformation front, orientation of strike-slip features, ...).

Also it could be very useful to include the Lower Rhine Embayment (striking approx 160 degrees) and the Osning Fault / the Inverted Lower Saxony Basin (striking ca. 130 degrees) as eastern and western boundaries of the block that you call the Ruhr Area, but could also be called the Münsterland Basin.

Last but not least, the Alpine Orogeny definitely contributes to the present-day stress field in your study area, however the Alps and their far-field tectonic effects (i.e., basin inversion in Northern Germany and platform tilting in the south) are not mentioned in the text.

Please check consistency of your data with additional literature and include this in your discussion.

I suggest to quickly study (at least) the following publications and briefly include the above mentioned aspects in your manuscript::

- Trautwein-Bruns et al., 2010: In situ stress variations at the Variscan deformation front — Results from the deep Aachen geothermal well. <https://www.sciencedirect.com/science/article/abs/pii/S0040195110003288?via%3Dihub>
- Nelskamp, 2011. Structural evolution, temperature and maturity of sedimentary rocks in the Netherlands: results of combined structural and thermal 2D modeling. <http://publications.rwth-aachen.de/record/64527/files/3625.pdf>
- Ahlers et al., 2021. 3D crustal stress state of Germany according to a data-calibrated geomechanical model. <https://www.semanticscholar.org/paper/3D-crustal-stress-state-of-Germany-according-to-a-Ahlers-Henk/ed4aeb3f60a817b1a6e4a3234f8d1cbcd0b06aa9>
- Bruns et al., 2013. Petroleum system evolution in the inverted Lower Saxony Basin, northwest Germany: A 3D basin modeling study. <https://onlinelibrary.wiley.com/doi/epdf/10.1111/gfl.12016>
- Ghazwani et al., 2018. Petroleum generation and storage in the Pennsylvanian coal-bearing strata of the Münsterland Basin, Western Germany: 3D basin modelling approach. https://www.schweizerbart.de/papers/zdgg/detail/169/90583/Petroleum_generation_and_storage_in_the_Pennsylvan?af=crossref
- Voigt et al., 2021. Dawn and dusk of Late Cretaceous basin inversion in central Europe. file:///C:/Users/roeth/Downloads/Dawn_and_dusk_of_Late_Cretaceous_basin_inversion_i.pdf
- Bradel & Draxler, 1982. ERWEITERTE COMPUTERAUSWERTUNGEN VON BOHRLOCHMESSUNGEN IN ROTLIEGENDESEDIMENTEN NORDDEUTSCHLANDS (OST-HANNOVER). <https://pascal-francis.inist.fr/vibad/index.php?action=getRecordDetail&idt=PASCALGEODEBRGM8220175530> or <https://www.osti.gov/etdeweb/biblio/5265273> ... original publication probably archived at DGMK e.V.

I would be also very happy to see additional figures in which the relationships between the regional tectonics and your local data are combined.

Looking forward to see an updated version of your manuscript.

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