Solid Earth Discussions

Solid Earth Discuss., referee comment RC1
https://doi.org/10.5194/se-2021-8-RC1, 2021

Comment on se-2021-8

Anonymous Referee #1

Referee comment on "Paleozoic-Mesozoic thermal evolution along the East European Platform margin based on kerogen thermal maturity analysis combined with apatite and zircon low temperature thermochronology in NE Poland" by Dariusz Botor et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-8-RC1, 2021

The manuscript presents an extensive study concerning the low temperature thermal evolution of the margin of the East European Platform. The new data include fission track on apatite using the external detector method, fission track measurements, U-Th/He dating on zircons. Data are integrated with stratigraphy from the boreholes, VR measurements, K-Ar dating, illite/smectite reflectance. Thermal modeling and T-t history for different regions are compiled.

In order to improve the manuscript several aspects are detailed below: Further suggestions are done directly on the PDF text.

- It is not mentioned in the Method in which laboratory fission track dating was done.

- The involvement and extent of fluid flow at the level of some of the stratigraphic levels should be treated with more caution presenting also alternative solutions which cannot be omitted at the present. Suggestions are given below and directly on the PDF text.

- I strongly suggest to insert on the map Fig. 1 and in table 3 previously FT dating already published by Srodon et al. 2013 and Botor et al 2019 (papers given below) and discuss the differences/similarities between published FT modeling results and present ones concerning the common investigated time interval/region.

´Srodo´n, J., Paszkowski, M., Drygant, D., Anczkiewicz, A., and Bana´s, M.: Thermal History of Lower Paleozoic Rocks on the Peri-Tornquist Margin of the East European Craton (Podolia, Ukraine) inferred from Combined XRD, K-Ar, and AFT Data. Clays and Clay Minerals 61, 107-132, https://doi.org/10.1346/CCMN.2013.0610209, 2013.

Botor, D., Golonka, J., Anczkiewicz, A. A., Dunkl, I., Papiernik, B., ZajaË□c, J., and Guzy, P.: Burial and thermal history of the Lower Paleozoic petroleum source rocks in the SW margin of the East European Craton (Poland). Annales Societatis Geologorum Poloniae, 89, 31-62, https://doi.org/10.14241/asgp.2019.12, 2019a.

Specific aspects as suggested by the editorial for review structure are given below. In the revised version changes on the text and new paragraphs should be marked with a different color in order to track them.

- Does the paper address relevant scientific questions within the scope of SE?

Yes

- Does the paper present novel concepts, ideas, tools, or data?

U/He dating on zircons is new for the investigated area as well as the intergration with other data.

- Are substantial conclusions reached?

In order to have an overview for the different thermal evolution of tectonic blocks/regions I suggest inserting a simplified map in the middle of page and adding the thermal evolution for different regions around.

- Are the scientific methods and assumptions valid and clearly outlined?
- Are the results sufficient to support the interpretations and conclusions?

The repeated references to fluid flow in order to explain the difference vitrinit/illite-smectite thermometry are not well argumented. Maybe these are the limits of the two methods VR and illite-smectite, more precision cannot be achieved. A method is not wrong if it cannot go under a certain "standard deviation". I suggest to model considering one of the methods, not making compromise of both or invoking fluid flow for discrepancies. New grown illite during fluid flow is a different task and a study which is for the moment not available.

- Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

In order to make some plots the distribution of track lengths for each sample is necessary. Usually in studies not all track lengths are given. So it is at the level of other studies.

- Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

Yes. It would be interesting to plot older Fission Track ages in the region as well on the map.

- Does the title clearly reflect the contents of the paper?

New are the Fission Track ages on apatite and the the U/He ages. The vitrinite data are from literature should be omitted from the title as other criteria are used as well for thermal modeling.

- Does the abstract provide a concise and complete summary?

Yes

- Is the overall presentation well structured and clear?

Improvements were already suggested, also directly on the PDF text.

- Is the language fluent and precise?

Yes

- Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes

- Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

Suggestions available directly on the PDF text.

- Are the number and quality of references appropriate?

ok

Please also note the supplement to this comment:
https://se.copernicus.org/preprints/se-2021-8/se-2021-8-RC1-supplement.pdf