

Solid Earth Discuss., referee comment RC2
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Comment on se-2021-15

Anonymous Referee #2

Referee comment on "Late to post-Variscan basement segmentation and differential exhumation along the SW Bohemian Massif, central Europe" by Andreas Eberts et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-15-RC2>, 2021

The authors provide a nice integration of different sourced data to investigate the segmentation and the differential crustal vertical movements along the southwestern margin of the Bohemian Massif.

In the light of the data interpretation the authors propose to separate the study area in three main crustal domains and five minor sub-domains based on different lithological characteristics, surface lineaments distribution and thermochronological data from literature. Major implication of their discussion consists in the identification of an inferred structural structure (the Cham fault) with a NNW-SSE striking orientation that separates two crustal block with relevant amount of differential vertical movement.

The paper is well written and well organized, the method and data are clearly described. All is clear and easy to read. I liked the methodological approach consisting in integration of Bouguer data with topographic analysis and thermochronological data.

The paper can provide a potential important contribution on the late to post Variscan orogeny deformation of the Bohemian Massif.

Nevertheless some critical points emerge from the interpretation of the data. Some of these can be easily solved, others need an improved discussion.

Some terminology is not properly used and can be misleading. I know that it is a boring and common debate, but terms uplift, exhumation and erosion should be used properly. For instance metamorphic data are usually used to quantify exhumation, i.e. the vertical movement with respect to the earth surface. It sounds strange quantify uplift by metamorphic condition. Same approach should be used with thermochronological data.

One of my main criticisms is in using the metamorphic degree as a tool to quantify differential exhumation of crustal blocks. The authors should review the different mineral assemblages that characterize each domain and evaluate the pressure condition that in this case can be eventually used to evaluate the depth of metamorphic event. I think that metamorphic degree only is not enough to discriminate the depth of the metamorphic event, especially in this case where differences of exhumation are proposed between domains of high metamorphic degree, e.g. between diatectic gneisses and diatextites.

I have also some remarks even about thermochronological ages interpretation. I find interesting the interpretation of regional pattern of fission track ages and I agree that different ages can reflect different post-cooling vertical movement. Nevertheless it is not obvious to ascribe a depth of closure to a zircon FT age especially when you are considering one sample only. Complex thermal histories made by long persistence on partial annealing zone can produce very different age also in close samples. For this reason more information on the discussed data (e.g. track length, thermal modeling), if available, could better support the thesis of the authors.

Following the data of Vamvaka et al. 2014, it seems that the major reason for different AFT ages is related to complex thermal histories. To be sure that regional pattern of AFT and ZFT ages reflects fault activity, a more precise discussion of thermochronological data is needed.

The pattern of AFT ages suggests that ages get younger moving to the eastern region. It seems to suggest a correspondence between younger AFT ages and higher topography. This can suggest a process of isostatic response to the long-lasting erosion. It might be the case?

Why the authors speak about apparent age?

The authors do not touch one of the main problems regarding all the remnant Variscan massifs in Europe, and that is the persistence of high topography versus topographic rejuvenation. It could be worthy to discuss your results in the light of this debate.