Referee # 2

Thank you for the revision. As stated in the previous comments, I maintain my position that the discussion would benefit a figure wherein the authors aim to summarize the main interpretations derived from their dataset (i.e., Landscape evolution). I am not fully convinced by your response, as I believe that any graphic is more accessible than delving into a paper text to follow your interpretations. If I were in your position, I would have attempted to frame the time of interest with a tectonic reconstruction to provide a hint on where and when major structures could be responsible for the two exhumation phases.

However, I get the impression that it may not be in your interest to speculate and consolidate these tectonic observations into a model that can provide context for this differential exhumation to a larger audience. I do not have any further feedback.

Best Wishes.

Answer:

Dear reviewer,

Although we initially disagree, we have followed your advice and added a figure (Figure 4) summarising our interpretation of the tectonics events that are responsible for the uplifting of the Ellsworth-Mountains.

Best wishes,
The authors

Referee #3

This manuscript presents new thermochronological data from the Ellsworth Mountains. This is an exciting region of general importance. However, as it stands now, the study requires major revisions.

The manuscript is a short communication on new ages. Based on the observed ages and the observation that the ages are partially reset in the upper part of the stratigraphic column and completely reset at the base, the authors argue that a major rearrangement of plates occurred earlier than previously known.

The presented data are of high quality. However, as it stands now the conclusions remain rather speculative. Standard age-elevation plots are missing, which would make it much easier to evaluate the results.

Answer: We have followed your advice and have added an age-elevation plot (Fig. 3b).

Different estimates of exhumation are presented but only as rough calculations. Instead, numerical t-T models should be performed. This could lead to very informative results, especially since parts of the ages are not completely reset. This should be accompanied by a more extensive discussion of the spread in single grain ages, particularly for the completely reset grains.

Answer: Although we agree that this is an interesting point, and it would be beneficial for the article, it is rather difficult to accomplish such a suggestion. This is mainly given by the fact that our study only has (U-Th)/He data, and t-T models of basins require further thermochronological constraints (e.g. Cogné et al., 2012; Jess et al., 2018; Prenzel et al., 2018; Gallagher & Parra, 2020; Krob et al., 2020; Licciardi et al., 2020; Wildman et al., 2021). Additionally, unfortunately, we cannot complement this with the literature, as there is no such information available. Therefore, we prefer to avoid modelling the t-T paths of the dataset, as it is.

- *Cogné, N., Gallagher, K., Cobbold, P. R., Riccomini, C., & Gautheron, C. (2012). Post-breakup tectonics in southeast Brazil from thermochronological data and combined inverse-forward thermal history modeling. Journal of Geophysical Research: Solid Earth, 117(B11).*
- *Gallagher, K., & Parra, M. (2020). A new approach to thermal history modelling with detrital low temperature thermochronological data. Earth and Planetary Science Letters, 529, 115872.*
- *Jess, S., Stephenson, R., & Brown, R. (2018). Evolution of the central West Greenland margin and the Nuussuaq Basin: Localised basin uplift along a stable continental margin proposed from thermochronological data. Basin Research, 30(6), 1230-1246.*

- *Krob, F. C., Glasmacher, U. A., Bunge, H. P., Friedrich, A. M., & Hackspacher, P. C. (2020). Application of stratigraphic frameworks and thermochronological data on the Mesozoic SW Gondwana intraplate environment to retrieve the Paraná-Etendeka plume movement. Gondwana Research, 84, 81-110.*
- *Licciardi, A., Gallagher, K., & Clark, S. A. (2020). A Bayesian approach for thermal history reconstruction in basin modeling. Journal of Geophysical Research: Solid Earth, 125(7), e2020JB019384.*
- *Prenzel, J., Lisker, F., Monsees, N., Balestrieri, M. L., Läufer, A., & Spiegel, C. (2018). Development and inversion of the Mesozoic Victoria Basin in the Terra Nova Bay (Transantarctic Mountains) derived from thermochronological data. Gondwana Research, 53, 110-128.*
- *Wildman, M., Gallagher, K., Chew, D., & Carter, A. (2021). From sink to source: Using offshore thermochronometric data to extract onshore erosion signals in Namibia. Basin Research, 33(2), 1580-1602.*

The tectonic history as well as the connection to the Transantarctic Mountains remain hypothetical. Suggestions from an earlier review to present more details on regional geology and discuss potential driving mechanisms have not been accommodated. These seem however crucial to support the conclusions. Similarly, the request for sketches of how the tectonic scenario is envisioned has not been accommodated. Such (maybe even only conceptual) sketches would greatly help understand the presented story.

Answer: We have followed your advice and added a figure that summarise the tectonic evolution of the Ellsworth Mountains (Figure 4). We have also modified the text accordingly.

In summary, this study is well written and has great potential with a sound data set from an interesting region. However, major revisions are required before this study can be published.

Answer: We have tried to modify the text and the figures accordingly to your advice. We appreciate the review.