Referee comments of Jensen and Hansen by Ray Donelick, Apatite.com Partners, LLC

Three broad review areas:

1. Scientific Significance: an initial paragraph or section evaluating the overall quality of the preprint ("general comments")

   This paper should be published. The use of deconvolution to separate "post-depositional" tracks from "inherited" tracks (page 11, line 242) is novel, refreshing, and useful. Nice work.

2. Scientific Quality: followed by a section addressing individual scientific questions/issues ("specific comments")

   - page 1, lines 16-17: "The extracted post–depositional histogram without inherited tracks may be used for thermal history calculation." I like this.
   - page 1, lines 50-51: "The effects are caused by personal etching and observational practice, and sampling statistics." Potentially of greater significance are errors of measurement due to a) fluid filling track tips, b) poorly chosen track tips, c) analyst inexperience.
   - page 3, lines 66-67; page 4, line 84: "initial track length $L0$" Do you mean "initial mean track length $L0$"? You need to make clear here that you intend to broaden the distribution about $L0$ due in part to the range of track lengths observed in relatively unannealed populations.
   - page 4, lines 101-102: "It is expected that long tracks are more likely to be etched and observed than short tracks when using the angle selection criteria (Ketcham, 2019)." This ignores track width. A more detailed analysis would rewrite this: "It is expected that horizontal confined tracks of large area (the product of etched length and width) are more likely to be etched"
   - page 6, Figure 2: "Broadening due to" "biases and uncertainties". Reword "initial length range, biases and uncertainties". Initial length range due largely to range of 238U (natural) or 235U (induced) fission energies.
   - page 11, line 243: "idealized (no broadening) model". If I understand correctly, "no broadening" also excludes the initial length range. If so, this is not idealized, but instead unrealistic. Use the word "simplified" instead.
   - page 11, lines 241-253: I like this.
   - page 20, Figure D1; page 21, Figure D2; page 23, Figure D4: Plots of Angle to c-axis (x-axis) vs. Track length (y-axis) are so lame. I suggest replacing these plots with polar coordinate plots to show a physical representation of the 3D distribution .

3. Presentation Quality: and by a compact listing of purely technical corrections at the very end ("technical corrections": typing errors, etc.).

   - page 1, line 19: Use "titanite" instead of "sphene".
   - page 1, line 48: Replace "counted" with "measured" in "given angle from the horizontal are counted".

Also address these questions:

1. Does the paper address relevant scientific questions within the scope of GChron?

Absolutely, as this work constitutes "…high-quality basic…research in geochronology…" and relates to "…developments in standardization and intercomparison…" (https://www.geochronology.net/about/aims_and_scope.html).

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

Yes.

3.   Are substantial conclusions reached?

Yes.

4.   Are the scientific methods and assumptions valid and clearly outlined?

Yes.

5.   Are the results sufficient to support the interpretations and conclusions?

Yes.

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

Yes. Please note that I made no attempt to verify the mathematical equations presented here.

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

Yes.

8.   Does the title clearly reflect the contents of the paper?

Yes.

9.   Does the abstract provide a concise and complete summary?

Yes.

10.   Is the overall presentation well structured and clear?

Yes.

11.   Is the language fluent and precise?

Yes.

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

Yes. Please note that I made no attempt to verify the mathematical equations presented here.

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

No.

14.   Are the number and quality of references appropriate?

Yes.

15.   Is the amount and quality of supplementary material appropriate?

Yes.