Technical Note: Improved calculation of volume, FT correction, and other derived data for polished zircon (U-Th)/He thermochronology
Barra Peak
Gchron-2024-33

Referee Report
This manuscript highlights the importance of accurate Ft and aliquot volume calculations in (U-Th)/He Thermochronology. The author provides improved equations to calculate Ft and grain volume accounting for grain polishing required to make in situ thermochronologic measurements. The author greatly improved the manuscript between the first and second round of revisions. I greatly appreciate the author's addition of a comprehensive synthetic dataset to demonstrate the effectiveness of the proposed protocol compared to former methods. I believe this work represents a substantial contribution to our field, and should be published following minor revisions to address readability.

Overall, the subject matter and scientific process in this manuscript are well presented. The manuscript could benefit from some minor edits to improve the flow. The introduction section, largely changed from the original submission, is somewhat disorganized. Much of the information presented in this section focuses on the technicalities of other methods for measuring V and Ft, which may be better discussed in section 2.

Line 9: "…maximum geologically relevant information" wording is clumsy and missing a preposition?

Line 17: You do not specify the acronym eU as effective uranium in your definition (Line 12)

Line 75-77: It is unclear what the subject of this sentence is. What is being directly compared to Ft corrections of whole grains?

Lines 74-104: This paragraph covers a lot of information (some of which might do better in the discussion, i.e. lines 87-89), and could be broken down to streamline the story. I recommend having a paragraph that outlines previous work and limitations followed by a paragraph describing your proposed methodology and how it addresses these limitations.

Table 1: Caption should include mention of where on the grain 2D measurements are taken on the grain (the polished surface?).

Line 524: Have you tried incorporating measurements of tetragonal grain "tippiness" or the pyramidal length measured parallel to c-axis from tip to base of the pyramid? The aspect ratio of these pyramidal terminations can greatly affect grain volume and surface area calculations.

Line 587: Section numbering is incorrect