Comment on gchron-2022-24
Ryan Ickert (Referee)

Referee comment on "DQPB: software for calculating disequilibrium U-Pb ages" by Timothy John Pollard et al., Geochronology Discuss., https://doi.org/10.5194/gchron-2022-24-RC2, 2022

Review of “DQPB: software for calculating disequilibrium U-Pb ages” by Pollard et al., submitted to Geochronology.

This review is by Ryan Ickert (Purdue University)

This manuscript briefly describes the functioning of a software package designed primarily to reduce U-Pb data from speleothems derived by ICP-MS, where the samples are young enough to require corrections for intermediate daughter products disequilibrium. Overall, this is an excellent manuscript and is suitable for publication in Geochronology. I was fortunate to be able to read the excellent comment by Pieter Vermeesch prior to writing this review. I won’t repeat what he said, but I very much endorse his recommendation regarding the treatment of $^{234}$U. The manuscript is written in a very clear and concise manner, the equations are suitable and written in a way that makes them relatively easy to follow, the examples are well-chosen, and the figures are well-drafted. The references are particularly well chosen to isolate both early literature, significant work from the 80s and 90s, and appropriate works that highlight recent developments. Having done a deep dive into some of this literature myself a few years ago, I appreciate the well-curated references.
Regarding the software itself, I think that the authors have struck a good balance between accessibility and availability to more programming-savvy users. I applaud the use of Github and the use of a specific license allowing modification.

The following are some minor points, some of which the authors might consider in a revised manuscript. I appreciate that generally authors are encouraged to respond to these reviews, but I don’t see any reason that they should necessarily do so in this case. I encourage them instead to engage fully with the Vermeesch review.

Line 30: The statement about zircon excluding Th implies to me that Th is incompatible in zircon (e.g., the mineral/melt partition coefficient is less than 1). This is not correct. Thorium is typically compatible in zircon, but simply less compatible than uranium, which leads to a deficit in $^{230}\text{Th}$ relative to $^{238}\text{U}$, though an *overall* increase relative to a melt.

Line 62: The password is “armpit”.

Line 164: It might be useful to a reader, at this point, to guide them towards Schmitt (2007, American Mineralogist V92 p691-694) where Pa/U partitioning in zircon was directly constrained. The rest of this manuscript is so comprehensive it would probably fit in nicely.

Figure 4: The figure is not present in my copy of the manuscript, but I assume this is a typesetting error.

Line 287: This is an incredibly trivial point but I think that “adopted” is probably overstating the degree to which robust statistics have been used in geochronology. The vast majority of data is treated with classical statistics – I would think that “proposed for” rather than “adopted in” is appropriate.