

Geochronology Discuss., referee comment RC2
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Comment on gchron-2022-24

Ryan Ickert (Referee)

Referee comment on "DQPB: software for calculating disequilibrium U–Pb ages" by
Timothy Pollard et al., *Geochronology Discuss.*,
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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}Th relative to ^{238}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.