

Interactive comment on “LA-ICP-MS U-Pb carbonate geochronology: strategies, progress, and application to fracture-fill calcite” by Nick M. W. Roberts et al.

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Received and published: 12 December 2019

“LA-ICP-MS U-Pb carbonate geochronology: strategies, progress, and application to fracture-fill calcite” is a well-organized, well-written manuscript that describes, in considerable detail, current methodologies and applications in dating calcite by laser ablation. It is likely to be a long-lived reference paper for anyone interested in dating calcite, as it contains many relevant examples, and an exhaustive list of our current understanding of the many aspects of calcite geochronology. I have a few minor comments that I believe could improve the original manuscript, but feel that the authors have already done a thorough job producing this work. The comments, related to line

C1

numbers, are as follows:

122: Isn't point 2 the same as point 1? You need more sample to get higher sample/blank ratios.

259: Is this really true? For example, do we know the absolute age constraints of WC1 better than Ash15 or Duff Brown? They are younger, but a 5% uncertainty on Ash15 is only 150kyr. Once counting statistics get better than a few percent, the increased precision is moot. It is true that secular equilibrium uncertainties can punish younger ages more in a relative sense; you may want to point to that part of the discussion here.

274: This is the main point here, which should be highlighted. When the data is closer to concordia, there is less variability in the intercept age no matter what the common component is. That is, your assumption on a fixed common value is less important when the samples are older. Nevertheless, if you can assume a fixed common component, or you have a large spread in μ , I'm not sure your confidence is better with an older sample (in an absolute age sense).

What might be nice in the figure is to show the relative and absolute age uncertainties on each isochron given either a fixed U concentration or fixed common Pb concentration. You could also use a fixed analytical percentage, but the younger samples might have worse analytical precision due to poor counts. Nevertheless, this addition would be more elucidating.

296: Why do you say inaccurate here instead of imprecise?

Figure 6: Here it would be nice to show a median value for other U- and Pb-bearing geochronometers as a comparison. I realize this is a tough ask, but you could take say apatite and or titanite from a paper that studied a range of samples.

644: I presume this is after repolishing?

1062: This sentence is awkward.

C2

1067: delete “they do”

Interactive comment on Geochronology Discuss., <https://doi.org/10.5194/gchron-2019-15>, 2019.