

Geochronology Discuss., referee comment RC2
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Comment on gchron-2022-3

Anonymous Referee #2

Referee comment on "Potential impacts of chemical weathering on feldspar luminescence dating properties" by Melanie Bartz et al., Geochronology Discuss.,
<https://doi.org/10.5194/gchron-2022-3-RC2>, 2022

Comments on 'Potential impacts of chemical weathering on feldspar luminescence dating properties' by Bartz et al.

A data rich manuscript presenting straightforward experiments to mimic chemical weathering and monitor associated changes in luminescence properties. The work is new and well within the remit of GChron. Chemical weathering has long been suspected as an important issue in luminescence dating but very few studies have so far been attempted to clarify its role. The manuscript under consideration adds to our rather limited understanding of feldspar luminescence alteration due to mineral surface dissolution. It is the nature of such an initial study that many more parameters remain to be explored but Bartz et al manage to establish a first set of results that will form a base for further investigations.

The manuscript is mainly well produced, needs some streamlining and more careful wording (comments below) and should be publishable after minor revisions.

General comments:

Please reflect on the terminology used: I found the term 'weathering' confusing where used as sample label. You are working on museums specimens that will probably not have

been exposed to weathering in nature. So may be use 'treated', 'etched', or other terms that better describe the state of a sample. Please use similar terms throughout the manuscript (and also in figure captions).

A related issue: In the discussion, please highlight that your results were obtained on museum specimens. Mineral grains extracted from sediments may respond significantly different to etching due to very variable pre-depositional mechanical and chemical alteration.

Parts of the results and discussion section need more precise wording, losing superfluous words and jargon. A job for the senior author?

Specific comments:

Abstract:

Line 16: change 'was accessed' to 'were accessed'

Lines 24 and 25: A rather strong wording given the limited number of specimens and acid treatments used. I would like to suggest to weaken this statement.

Main text:

Line 67: Wording - what is 'challenging' about putting an adequate optical filter in the detection pathway?

Line 73: '...well as changes' change to '...well as to changes'

Line 104: '(unweathered)'? would '(untreated)' be more adequate? Please print units with all digits: 0 h, 4 h, 96 h, 240 h, and 720 h.

Lines 109 & 110: wording - change: 'hydrolysis conditions, which allow it to efficiently leach transition metals and trace elements from the surface of minerals without destructuring the silicate' to 'hydrolysis conditions and efficiently leaches transition metals and trace elements from the mineral surface without destroying the silicate'

Line 105 versus line 115 – please clarify: was shaking applied in both experiments over the full period?

Line 120: wording – 'weathering time point' change to 'experiment duration' or similar

Line 123: Unclear – 'Sc was used as an internal standard'. Have values been normalised to Sc concentration?

Line 139: Change 'were used' to 'was used'

Line 143: Change 'were weighted' to 'was weighted'

Line 149: Unclear: 'background noise' – given your measurement setup I expect that the majority of background signal was due to black body radiation and not noise. Did you check the reproducibility of the setup?

Line 160: Please print units with all digits.

Line 168: Change 'were used' to 'was used'

Line 171: 'feldspar sample compared to the pure' change to 'feldspar sample and given as percentage of the pure'

Line 173: 'higher Ca content' needs a comparator - compared to?

Line 198: 'The same' better 'Similar'

Line 204: Please print units with all digits.

Line 215: wording – While the shape of the TL emissions is unaltered even after the intensities of the TL emissions increased....

Lines 219 - 223: wording – is it 'no significant change can be detected due to inter-aliquot variability?'

Chapter 4.2.2 – please reword. Shorten and focus using more precise terminology and descriptions. Some suggestions here:

Similar lines 230 - 233 – is the scatter significant? If not, refrain from speculating.

Line 235: 'up to saturation' - be more precise: The highest applied dose was 2250 Gy – the dose response (S&) is still growing...

Line 236: unclear – delete: 'Normalised to the initial D_0 values,'

Line 241: change 'could be' to 'were'

Discussion lines 280-290. Is this a good analogue for chemical weathering in, for example, a soil?

Line 315: unclear – 'when using the blue filter pack.' Is it 'the 410 nm emission.?'

Figure 1:

I find the semi-logarithmic graph design not very clear. May I suggest plotting the data as percentage change on a linear scale? You can show all results in the same graph by normalizing the concentrations to the initial value. This should reveal potential trends more easily. In addition to the different symbols, you may also want to use a colour scheme.

Figure 5, Caption: Unclear – 'All curves'? is it 'All symbols'?