Geochronology Discuss., editor comment EC1
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comments and decision from associate editor

James Feathers (Editor)

Editor comment on "Spatially resolved infrared radiofluorescence: single-grain K-feldspar dating using CCD imaging" by Dirk Mittelstraß and Sebastian Kreutzer, Geochronology Discuss., https://doi.org/10.5194/gchron-2020-43-EC1, 2021

This is the associate editor here. I have read the comments from the three reviewers and the responses from the authors. I had also made some comments directly to the authors and they responded to them. I include here my comments and their response, in the interest of full open access.

I am satisfied with the responses by the authors to the reviewers' and my comments. I have seen the updated manuscript and I think it is now ready for publication. The authors just need to upload it, and I will make that recommendation

Dear Prof Feathers,

Thank you very much for your support and your positive response. We carefully considered all your com-
ments, please find our detailed answer below:

Line 43 - Is it Charge Coupled Devise (Wikipedia) or Coupled Charge Devise (your usage)? Are
they interchangeable?
This was a mistake on our side, and it is now corrected.
Line 50 - Image noise and signal cross talk are technical issues, not methodological ones. Then
in line 51 you can say luminescence imaging “methods”
Thank you; corrected.
Lines 151-4 - Why not give the settings and say they are identical to Frouin et al. 2017, and leave
it at that, rather than mention Frouin et al. 2015 and whatever contrary information might be
found in Frouin et al. 2017 (which I do not see how can be erroneously reported when your paper
is not published yet.)
You are right, this makes indeed more sense, and we changed it accordingly. Regarding the reporting:
perhaps what the reviewer meant was that our preprint is already citable because it has a DOI. Even the
paper would be rejected for publication in the GChron, the manuscript will be still retrievable under GChron

Discuss.
Section 2.4.1 - What kind of absolute temperatures are you talking about here? Does the cooling
system come with the camera or is special equipment required?
In our case no special equipment is needed, the cooling system is inbuilt and part of the camera system. The
minimum CCD temperature should be at about -75°C if no degradation have occured, like at our camera.
We rephrased the part to account for your comment.
Section 2.43 - Why do you need an EM-CCD camera if you do not use the EM part of it? Does
an EM-CCD camera have other qualities that make it useful. Maybe a little more justification
of the camera choice could be added in your description of the camera earlier.
The camera, as available in the lexsyg system and used by us, was purchased to serve multiple purposes.
Usually, the camera alone costs around 60 kEUR (+ VAT). This means when you buy such an expensive
system (you have to add ~200 kEUR for the measurement system), you select a camera that covers a wide
range of possible application, like spatially resolved OSL or TL. Of course, if we think of an IR-RF only
system, a better or cheaper choice could have been made at the cost of flexibility.
To clarify that the camera can also be used for other purposes, we stated the possibility to perform TL and
OSL measurements in the Equipment section and refered to Richter et al. (2013) and Greilich et al. (2015)
for examples.

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Line 201 - Just to clarify, is an image stack (series of images) just a collection of light intensities
as the irradiation proceeds, kind of like the bin channels in PMT output, except for several grains
at a time?
Yes, this would be a sensible analogy.
Table 4 - Why does a dim sample require a smaller ROI diameter than a bright one? Intuitively,
I would think the opposite, but maybe I am not understanding.
The ROI diameters at the high SNR settings refer to binned pixels. 2x2 superpixel have the twice the length
of single pixel. Therefore, the dim sample ROIs are indeed larger than the bright sample ROIs. In an earlier
version of our manuscript, we provided additional information regarding this issue in the appendix. We have
removed that part due to the streamlining process before submission. Now indeed some crucial information
is missing. Therefore, we expanded Table 4 to account for your comment.
Line 303 - I understand the horizontal sliding to determine the equivalent dose, but what does
the vertical sliding do - correcting for some kind of sensitivity change? Instead of just citing
Murari et al., perhaps an added sentence to explain this.
The vertically sliding ensures that curve shapes match. Usually, the shape of the IR-RF curves (natural and

regenerative) are very reproducible. However, their "starting" point on the y-axis may change for different
reasons (sensitivity, yes, and machine-related issues). We added a few more lines.
Line 343 - How does the pixel ROI diameter compare with the actual grain size?
We listed this information in Table 4. Our experiments found that the best results were obtained for ROIs
diameters slightly larger than the optimal settings.
Line 362 - How would you propose gaining a better estimate of σb? Dose recovery?
Complicated. The σb value is very tricky to estimate. Dose recovery tests certainly help, but additional
modelling on the dose rate end would be needed too. There is currently another manuscript (Mercier et al. in
preparation) for submission to GChron that deals with this question, but this is here beyond our scope.
Line 420 - This sentence seems garbled to me. Rewrite please.
Done and rephrased.
Lined 429 - Something is missing here.
The citation was not resolved properly, fixed.
I also read the reviewer comments and your response to reviewers 1 and 2. I think you adequately
addressed their concerns, but wonder concerning Reviewer 1's point about higher heat from
increased UV and whether a shallow TL peak is activated if you could add a sentence or two
about this in the paper. I thought your explanation was good and deserves inclusion, to some
degree, in the text.
We added a few additional lines next to the bleaching settings to clarify that the increased UV power setting
did not likely change the sample's temperature.

Dirk Mittelstrass, Freiberg and Sebastian Kreutzer, Aberystwyth, March 24, 2021

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