Response to the editor

Dear Prof Feathers,

Thank you very much for your support and your positive response. We carefully considered all your comments, 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.

> 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 σ_b? Dose recovery?

Complicated. The σ_b 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

References

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