Geochronology Discuss., referee comment RC1
https://doi.org/10.5194/gchron-2020-43-RC1, 2021

Comment on gchron-2020-43

Anonymous Referee #1

Referee 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-RC1, 2021

- **General comments**

The paper presents a new procedure for single grain IR-RF dating using a CCD camera fitted on a Lexsyg Research device. The manuscript presents a successful spatially resolved (SR) IR-RF dose recovery test on an artificially irradiated sample. A second dose recovery test on a naturally sample however gives more scattered dose results with several components. While the lowest component agrees with the expected dose, the average dose overestimates the expected dose by 50%. These experiments also reveal an unstable signal background due to a degenerated cooling system, which is important to check before conducting any SR IR-RF measurements. Besides these issues, the SR procedure seems robust and simple to use. I appreciate the description of the camera settings, and the statement on the scientific dimension. This paper is a great contribution for IR-RF users and I therefore recommend its publication in Geochronology.

- **Specific comments**

I only have minor comments.

Page 6, Figure 2: how was the exposure time determined at 4.2s? Why does the channel time (5s) higher than the exposure time?

Page 7: The solar simulator settings here are not the same as Frouin et al. 2015. Please check the numbers.

Moreover, the UV intensity has been doubled. An increase in UV induces a higher temperature during bleaching, which can activate a shallow TL peak (at ~120C at 10C/s, Huot et al., 2015). I am therefore not convinced that:

- 1hour pause is sufficient for the thermocouple to completely cool down (see Huot et al., 2015 fig. 3) and for the phosphorescence signal to completely disappear,
- and that the RFreg signal truly compares with the RFnat signal (if the shallow TL peak has been indeed activated during bleaching).

I wonder if the large scatter on the natural sample can be due to this variation in temperature during the IR-RF measurement procedure (due to high UV contribution) and/or insufficient pause.

Page 14, line 281: what signal did you use for the Feldspar paleodose?

Page 14, line 289: same question

Page 17, figure 6. It would have been nice to see a picture of each aliquot in daylight for the readers to have an idea where the signal is coming from and see how close to each other the grains actually are. It looks like the light is coming from a much smaller area than the grain. Could you comment on that?

- **Technical corrections**

Page 2, line 28: there are three "and" in one sentence. Please remove one at least.

Page 2, line 42: (e.g. Duller and Roberts **(**2018**)**) replaced by (e.g. Duller and Roberts, 2018)

Page 6, Figure 2, caption: change the quote marks

Page 6, line 141: "measurements: **o**ne…."

Page 15, figure 5, B, the graph shows a IRreg signal measured for 8000s but line 298, it is written that the measurements were done until 10,000s.

In caption, please add "grain diameter: 7 px"

Page 15, line 295: did you use silicon to mount the grains?

Page 18, line 357: "IR-RF age of ca 31 ….Gy" and "quartz age of 26.1… Gy", you mean "ka" I guess?