Author's response to the technical corrections outlined by AE Sumiko Tsukamoto

Thank you very much for submitting the revised version. As both reviewers noted, the manuscript has improved significantly and can be accepted for publication in Geochronology, after minor technical corrections raised by the reviewers.

We thank AE Sumiko Tsukamoto for reviewing the work and for providing the technical comments. Below, we provide point-by-point responses to each comment.

Nevertheless, the paper could still benefit from minor modifications/rephrasing, as some points remain potentially confusing. In particular, the main issue is that the authors used single grains with a fixed regenerated dose for the bleaching experiment. While this approach is suitable for comparing the bleachability of signals among samples with different localities and chemical compositions, the presence of a residual dose after two days of bleaching suggests that this duration is not sufficient to completely reset the signal. This appears inconsistent with the bleaching experiment starting from 30 Gy, which indicates that a plateau is reached after two days. This is particularly problematic in the abstract, where the methodology of the laboratory bleaching experiment is not adequately elaborated. I encourage the authors to carefully review the manuscript again to ensure that no potential sources of confusion for readers remain.

Thank you for this comment. We have carefully reviewed the manuscript and have addressed potential sources of confusion, particularly in the abstract, to improve clarity for readers. We have now stated that in our bleaching experiment, "grains were given a fixed regenerated dose of 30 Gy prior to solar simulator exposure".

We have also mentioned that "the relationship between residual dose and natural remnant dose also suggests that while the youngest samples (with low natural remnant dose) could reach zero residual dose, the relatively older samples (with more than 10 Gy of natural remnant dose) could show a significant amount of residual dose."

Additionally, to minimize any potential ambiguity for readers, we have now also defined the term 'remnant dose' in the abstract.

Line 18: even though it might be obvious, please define the number in subscript (IRSL200) properly in the first appearance both in the abstract and in the main text.

Reply: Done

Line 69: the positive correlation between De and the laboratory residual dose was interpreted that the laboratory bleaching time was not long enough, which was clearly demonstrated by Kars et al. 2014.

Reply: We have now explicitly mentioned the interpretation of Kars et al. (2014).

2.4: I may have overlooked this, but how did you treat the measured residual L/T values (Table 2, step 2) in the bleaching experiment data? Were these values subtracted, or not?

Reply: We did not subtract or otherwise correct any measured L/T values from the bleaching experiment, aside from normalizing them to the 0-minute measurement. As outlined in Step 2 of Table 2, the first residual dose was determined (using a full dose–response curve) after 2 days of bleaching in Sol2. Following this measurement, grains were screened using the acceptance criteria described in Section 2.3, and residual doses were calculated only for the grains that passed these

criteria. These accepted grains were then tracked through all subsequent bleaching steps and form the basis of the interpretations presented here.

Best wishes,

Sumiko

Author's response to the technical corrections outlined by Anonymous Referee #2

I am glad to see the great improvement of the manuscript in the reviewed version. It presents a very interesting and useful study that the scientific community will benefit from. Congratulations to the authors on their improved manuscript. I have listed a few technical corrections below:

We thank anonymous referee #2 for reviewing the revised version of our manuscript and for the technical corrections provided. These comments have helped improve the clarity and overall quality of the work.

Below, we respond point-by-point to each of the technical corrections raised by anonymous referee #2.

Line 234: should this be 2880?

Reply: Yes, it should be 2880. We have corrected this now.

Line 276: Please use a consistent number of decimal places as used for Mean De e.g. 2.44±0.26 and 9.49±0.39. The same applies to line 350.

Reply: Done.

Line 369: fig. 4a should be changed to Fig. 4a-d.

Reply: Done.

Line 370: Fig. 4b should be changed to 4e.

Reply: Done.

Line 374: Please replace "2880 minutes" with "2 days" to avoid confusion with the residual signal (normalised Lx/Tx data) reported in the bleaching experiment.

Reply: Done.

Line 407-410: you may also consider referring to Fig. S5 here for better clarity.

Reply: Done.

Supplementary:

Line 170: remove "respectively"

Reply: Done.