Review egusphere-2023-2471 by Jungyu Choi et al.

This paper is an extensive study using different luminescence signals to investigate and date plaggic anthrosols at a site in The Netherlands. The paper is data-rich, well-written and interesting to read. Samples are generally young (hundreds to thousand years) and soil mixing processes are active so the challenge is to interpret D_e distributions in terms of bleaching and mixing, and to try to extract the correct D_e from the D_e distributions. I have one major comment on the methodology that the authors should address.

Major comments

1) From the application of a Minimum Age Model (here bootstrapped MAM) to both quartz OSL and feldspar pIRIR signals the reader would infer that both the feldspar pIRIR and the quartz OSL signals are partially reset or show (high) dose tails (possibly due to mixing). However, at least 3 samples (NCL-11171 28,29 &30) have an quartz OSL over-dispersion (OD) of ~15% (see Fig. 5) and this is identical to the input OD of a well-bleached sample for BsMAM modeling. So, one would consider these samples as well-bleached for quartz OSL. Do the BsMAM and the CAM (or weighted or unweighted means if the authors prefer) give the same answer as the BsMAM for these samples? If the BsMAM works for well-bleached material both models should return identical results and the authors should demonstrate this. The CAM results should be listed and compared with BsMAM.

Actually, the authors themselves allude on samples with well-bleached quartz OSL characteristics (see lines 394-395); please show the quartz OSL D_e distributions for all samples in Supp Info.

Would it be possible to discuss the average IR_{50} results in this paper too? If the IR_{50} signal is sufficiently reset which is definitely possible for the three samples mentioned above, these samples are likely to give IR_{50} ages smaller than quartz OSL (because of fading). The samples that are less-well bleached for both IR_{50} and $pIRIR_{180}$ signals will tend to give ages equal to or larger than quartz OSL. I miss a discussion at the level of the average behaviour (CAM, weighted mean) in this manuscript.

This leads me to the proposed research question: 1) How can well-bleached grains be identified for feldspar single-grain pIRIR dating? In my view, to answer this question one needs some form of independent age control. I cannot find that in this paper, especially because the authors believe that the quartz OSL ages should also be inferred from a MAM approach. The best option in the case one does not have independent age control, would be to use a well-bleached, unmixed quartz age (from CAM) and compare with the MAM age of feldspar pIRIR (filtered or unfiltered).

2) I cannot seem to find the radionuclide concentrations, used water contents and the total dose rates in the paper. These data are crucial to calculate luminescence ages and should be tabulated.

Minor comments:

Suppl Mat A.1 (Table): suggest to change cutheat to preheat. Cutheat refers to immediate cooling after reaching temperature but test dose preheat here has duration of 10s.

Line 17: humans, remove second recently,

Line 36: has created

Line 39: factor in the creation of anthrosols?

Line 56 (caption): at Braakmankamp

Line 79: remove full stop after question mark

Line 102: northern

Line 145: place at a site

Line 159 (caption): in areas with coversand

Line 162: At all depths

Line 169: gleying

The K-feldspar grains were not etched. Did you take into account an external alpha contribution? If so, how large is it?

Line 246-247: These contrasting effects, von Suchodoletz

Line 252: Poolton et al. looked at elevated temperature IRSL but not post-IR elevated temperature IRSL? Please check, if not pIRIR, then remove ref.

Lines 285-286: not logical after previous sentence in which it is stated that TT is very small or negligible (at least I cannot see a trend). There is more scatter in the results but this is not necessarily due to thermal transfer? Can also be sensitivity changes not full accounted for by test dose? Please rephrase.

Line 324: majority of the samples

Line 343: Fig. 7a

Line 346: remove second full stop