

Geochronology Discuss., referee comment RC2
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Comment on gchron-2021-24

Michal Ben-Israel (Referee)

Referee comment on "In situ-produced cosmogenic krypton in zircon and its potential for Earth surface applications" by Tibor János Dunai et al., Geochronology Discuss., <https://doi.org/10.5194/gchron-2021-24-RC2>, 2021

In this manuscript, Dunai et al. examine the feasibility of in situ produced cosmogenic krypton in terrestrial zircon to study surface processes and demonstrate its applicability using a set of samples from the Vogtland region that experienced periglacial conditions during past glaciations. This work thoroughly examines the different Kr isotopes and their various production pathways recognize the most suitable isotopes for studying surface processes (^{78}Kr , ^{80}Kr , ^{81}Kr , and ^{82}Kr), and presents a ^{10}Be cross-calibrated production rate that is close to the experimental rate.

Overall I think this is a thorough and well-written paper that could be published in something close to its present form. I think the authors present a new and potentially very valuable tool in cosmogenic nuclide geomorphology. I do have some minor comments that I think could improve the manuscript.

Line-by-line comments:

Line 17 (abstract): In situ is written here with a dash (in-situ), while it is written without a dash throughout the rest of the manuscript.

Line 20 (abstract): please include more detail about the results reached (i.e., sediment production and storage dynamics in the study region during MIS 22-16).

Figure 1: I had a bit of a hard time following this figure. Is the y-axis the normalized krypton abundances or the relative yield? If it is the normalized abundances, does the normalization factor change with the source? If so, please specify. Other than that, I found the color scheme to be hard to follow and not colorblind-friendly.

Lines 465-469: Could this be a result of Kr diffusion from zircon? While there is some discussion of the possible effects of diffusion on Kr in zircons under earth-surface temps, I think this should be considered, especially as it seems to be more pronounced in samples that might be less 'structurally intact'.

Lines 647-652: It would be interesting if you could include the % ratio of nucleogenic to cosmogenic Kr in your samples. It could give a better understanding of how negligible is nucleogenic Kr.