

Technical Corrections:

In the Table 1 caption, after reporting that all uncertainties are 95% CL, the Jaffey et al. ²³⁸U decay constant is given at $\pm 1\sigma$. Also, when using the Jaffey et al. and Cheng et al. decay constants together, especially to construct age models, you can use the smaller set of uncertainties reported in Cheng et al. to avoid double-propagating the (systematic) ²³⁸U decay constant uncertainty into the ²³⁴U and ²³⁰Th decay constant uncertainties. I recognize the decay constant uncertainties are not important for this application, though, and you may remove all of them from the manuscript if you prefer.

Response: We are thankful to the editor for noticing this mistake, we corrected into a 2 sigma uncertainty for the ²³⁸U decay constant. All the calculation were done without using the reduced set of uncertainties of Cheng et al. (2013). While we recognize that using this set would be more correct, it has no significant change on the age uncertainties reported in this study, so at that stage of the publication we prefer to keep it as it is. We also prefer to keep in the manuscript the uncertainties of the decay constant that we used in the calculation for transparency purpose.

In the Table 1 footnote ***, change “ratio” to “activity ratio” or enclose the ratio in parentheses.

Response: Done

Figure 5 caption: The ages on the *right* are the STRUTages...

Response: Done

Line 148: Add a period after chamber.

Response: Done

Line 154: Remove the acronym “SRM” that does not apply to IRMM-184 and add a reference to the 2022 Richter et al. recertification of IRMM-184. Also, note that its estimated ²³⁵U/²³⁸U atom ratio changed to 0.0072631 ± 0.0000011 (95% CI). The change will make no difference to your reported data and ages, but you might as well cite the most up-to-date value. You can find that report here:

<https://crm.jrc.ec.europa.eu/p/IRMM-184/n-236U-n-238U-uranium-isotope-amount-ratio-5-M-HNO3-solution-HNO3-n-235U-n-238U-n-234U-n-238U/IRMM-184-URANIUM-238-NATURAL-ISOTOPIC-NITRATE-SOLUTION/IRMM-184>

Response: Done

Line 161: Change ‘value’ to ‘activity ratio’.

Response: Done

Line 162: Change 150 to 1.50. The *** subscript in Table 1 gives detrital ²³⁰Th/²³²Th activity ratio uncertainty as ± 0.50 and here in the text is ± 0.75 . Please change the relevant uncertainty in the text or footnote and double-check that it matches the uncertainty propagated into the appropriate Table 1 detrital-corrected ages.

Response: Done. We replaced the $1.50 \pm 0.50\%$ uncertainties in Table 1 subscript by 1.50 ± 0.75 .

Line 389: Change 'diagenesis' to 'diagenetic'.

Response: Done

Line 390: Change 'such processes' to 'diagenesis' and 'petrography' to 'petrographic'.

Response: Done

Line 429: Change "Let's consider a scenario where this cave presents historic paintings. The analysis presented in this study can be performed..." to "Considering a cave with historic paintings, the analyses presented in this study could be performed.."

Response: Done

Please notice that there was a mistake in the reported masses in the sentence line 435:

"A high-precision microdrill could be mounted on an automated arm for sampling every 100 μm , and the dust collected by a research-grade dust collector. This would represent about 5 mg of matter for a 0.5 mm diameter drill bit, and up to 20 mg for 1 mm diameter drill bit"

This sentence has been replaced by the following, with corrected values:

"A high-precision microdrill could be mounted on an automated arm for sampling every 200 μm , and the dust collected by a research-grade dust collector. This would represent about 3 mg of matter for a 2.5 mm diameter drilling, and up to 11 mg for 5 mm diameter drilling".