

Comment on gchron-2022-10

Karel Zak (Referee)

Referee comment on "²³⁰Th/²³⁸U isochron dating of cryogenic cave carbonates" by Paul Töchterle et al., Geochronology Discuss., <https://doi.org/10.5194/gchron-2022-10-RC1>, 2022

General comments

One of assumptions on which is based this study is formation of all CCC particles in one patch within one water freezing event. The reasoning for this assumption is based on the occurrence of typical sequence of CCC morphological types, each characterized by carbon and oxygen stable isotope data in an explainable logical sequence, which is in accord with known principles of stable isotope fractionation under water freezing conditions. This assumption is most probably valid, nevertheless, certain uncertainty remains. Under oscillating climate of the Last Glacial similar climatic conditions could occur repeatedly and all other factors are constant or highly similar – cavity morphology, its depth below the surface, lithology and chemistry of the limestone, characteristics of the epikarst zone, etc. We can therefore speculate that repeated freezing conditions with similar morphology of the ice fill the cave and similar chemistry of water which freezes could produce repeatedly the same sequence of morphological types with similar evolution of C and O stable isotope data in the carbonate. After ice melting the products of two or more freezing events could have been deposited together in one patch. An approach which can possibly shed some light on this can be detailed mapping of size distribution and distribution of individual CCC morphological types within each of studied patches together with detailed mapping of patches (giving their dimensions and shapes).

Since the study site is presented as a CCC locality for the first time in the international literature, the position of the studied sites within the cave should be presented in more detail, either in a cave map (can be included in an electronic supplement) or by coordinates and/or description in the text. I also consider as important to specify in the discussion from which direction the water producing the CCCs most probably entered the cave. Was it dripping water or flowing water from some kind of periodic water stream? This has some consequences regarding the transport of clay particles within the cave and thus for the interpretation of Th contamination of the samples. It would be useful to compare the levels of clastic Th contamination of the studied samples with ²³⁰Th/²³²Th ratios of other studied and published localities.

Detailed comments

The studied site

Please give an information here about the cave chimneys directed toward the surface. Are they all sediment or limestone boulder blocked? The cave entrance was artificially excavated? What have possibly been the circumstances of cave connection toward the surface in the Last Glacial?

Results

How do you know it is only the calcite? Based on crystal morphology only? There is no information about XRD mineral identification in the Methods.

References

The list of references is complete and there is no extra reference. The guide for authors is not followed completely. The journal names should be abbreviated and the order of references should follow the guide for authors (copied from this source):

- Single author papers: chronologically, beginning with the oldest. If there is more than one paper in the same year, a letter (a, b, c) is added to the year, both in the in-text citation as well as in the reference list.

- Co-author papers: first alphabetically according to the second author's last name, and then chronologically within each set of co-authors. If there is more than one paper in the same year per set of co-authors, a letter (a, b, c) is added to the year both in the in-text citation as well as in the reference list.

- Team papers: first chronologically (beginning with the oldest), independent of the team author names, then alphabetically within each year according to the second (third, etc.) author. If there is more than one paper in the same year for a first author (independent of the team), a letter (a, b, c) is added to the year both in the in-text citation as well as in the reference list.

Please also note the supplement to this comment:

<https://gchron.copernicus.org/preprints/gchron-2022-10/gchron-2022-10-RC1-supplement.pdf>