The Cryosphere Discuss., 4, C666–C669, 2010
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The Cryosphere Discussions

Interactive comment on "Cryogenic and non-cryogenic pool calcites reflect alternating permafrost and interglacial periods (Breitscheid-Erdbach Cave, Germany)" *by* D. K. Richter et al.

Anonymous Referee #1

Received and published: 14 August 2010

Dear Editor,

this is an interesting paper that presents detailed crystallographic investigations and new valuable isotopic data on cryogenic and non-cryogenic calcite speleothems from a German cave. Both the topic and the results align well with the scope of the Cryosphere journal. The manuscript is rather clear (some re-organization and English improvement are recommended) and warrants publication after some minor revisions. It would be in the benefit of the paper if the authors pay attention to the following points:

The term SINTER is EXCESSIVELY used throughout the paper! I suggest the authors follow Hill & Forti (1995, 1997) terminology when discussing various speleothems and avoid using associations like: rhombohedral crystal sinters, pool sinter, sinter formation, etc.. The term sinter is rather confusing when used in the context of this paper, especially considering the common definitions listed below and the fact that the SPELEOTHEM term was introduced to specifically define all secondary precipitates in caves:

"Sinter = Mineral deposit with a porous or vesicular texture (having small cavities). At least two kinds are recognized: siliceous and calcareous. Calcareous sinter, sometimes called tufa, calcareous tufa, or calc-tufa, is a deposit of calcium carbonate, exemplified by travertine. So-called petrifying springs, not uncommon in limestone districts, yield calcareous waters that deposit a sintery incrustation on objects exposed to their action. The cavities in calcareous sinter are partly due to the decay of mosses and other vegetable structures that have assisted in its precipitation" (Britannica Encyclopedia).

"... a precipitate of mineral springs; a general term used by Europeans for cave travertine" (Hill & Forti, 1997)

For example: small sinter precipitates - tells nothing to cavers or karst scientists, whereas spar precipitates or simple crystal (rhombohedral or or types) are much easier to understand.

Same problem for: small sinter precipitates from sinter basins - this is really confusing!

I suggest authors to refrain using sinter but naming the types or subtypes of speleothems they investigated. If some of the samples are not in the form of speleothems, aggregates is a viable alternative.

Because the Conclusion chapter does not really convey any conclusions, I suggest it is merged with chapter 5, which can be renamed: Results & Discussions. If authors insist

in having a Conclusion chapter, then they need to do a better job in emphasizing the main results of their study, how these results are different or unique when compared with those already published by Lacelle et al., Zak et al., Spoetl, Richter etc.

Fig. 2 and fig. 4 should be merged, so that Fig. 4 becomes an inset of Fig. 2.

It will be easier to follow the explanations in text and also in the cartoon if the X-axis in Fig. 9 is reversed to show OLD in the left and YOUNG in the right side. This way the events on the cartoon and graph will "flow" in the same direction.

I have to argue the following statement made by the authors on page 1020, line 12 (under ch. 5 Discussion): There is no field or petrographic evidence, however, suggesting that fluctuating .... ". This is not entirely correct, as papers such those of Andrieux (1963), Diaconu (1990), Onac (1996) discuss various aspects concerning genesis and morphology of speleothems as a result of fluctuating paleo-waters in pools. In addition, there are cathodoluminescence studies that show zoning in pool spars due to changes in water chemistry as a result of fluctuating supply of solutions.

It would be useful if authors can add a table with all their isotopic values (even if published as supplemental online materials). Have authors analyzed the present day dripping water in the cave (d18O, d13CDIC)? If yes, these data should be included in the table as evidences for their discussion chapter.

Some specific points:

pag. 1012 - abstract, line 8: "....reflect mean levels of cave ventilation" I don't quite understand this statement and it is not properly elaborated anywhere in the manuscript. Either delete it from abstract, or make the case in your discussion section!

pag. 1013, line 10 - " ..between warm and cold periods." What are the authors trying to say? warm to cold periods within a year (like seasons) or glacial/stadial to interglacial/interstadial? There are many caves (that host perennial ice accumulations) in which such crystals form most of the year, and therefore no need for such transitions! It

is important that authors clearly state that this is the scenario for the cave they studied, and it is not a general trend in caves

pag. 1013, line 14: temperature rising (not warming)

pag. 1014, line 2: "before mentioned types of "crystal sands" - There is no mention of such crystal sand in any previous page, so please define it

pag. 1014, line 13: is the age of the karst Cenozoic or is the karst that is formed on Cenozoic rocks? Please clarify

pag. 1016, line 22: what is your explanation the only here you find white to buff-colored crystals?

pag. 1019, line 21: observation #1 under Discussion: I don't see the point made by the authors. Most speleothems that form in pools or at pool surface (rafts etc.) are precipitated because of degassing of CO2. What are the evidences that support this hypothesis? are there any obvious differences in stable isotope composition? Authors need to make this point a bit clearer.

References: Andrieux, C. 1963. Étude cristallographique des pavements polygonaux des coulée poly-cristallines de calcite des grottes, Bull.Soc.franc.Minér.Crist., LXXXVI, 135-138. Diaconu, G. (1990), Closani Cave. Mineralogical and genetic study of carbonates and clays, Miscellanea Speologica Romanica, 2, 3-194. Hill, CA, Forti, P. 1995. The classification of cave minerals and speleothems. Int. J. Speleol., 24: 77-82. Hill, CA, Forti, P. 1997. Cave minerals of the world. Natl. Speleol. Soc., Huntsville, AL. Onac, BP 1996. Mineralogy of speleothems from caves in Padurea Craiului Mountains (Romania), and their palaeoclimatic significance, Cave and Karst Science, 24(3), 109-124.

Interactive comment on The Cryosphere Discuss., 4, 1011, 2010.