The Cryosphere Discussions

TCD

Interactive
comment

Interactive comment on "Detecting of Cave Floor Ice Dynamics based on Selective Cloud-to-Cloud Approach" *by* Jozef Šupinský et al.

Aurel Perşoiu (Referee)

aurel.persoiu@gmail.com

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Supinskyy et al (2019) present the results of TLS-based measurements of ice levels in Silickaa l'adnica cave (Slovakia) and argue for an extended use of the method to further study ice dynamics in caves. The technical part of the text seems well-presented and sound, but the discussion of the results lacks clarity in some parts. I suggest the authors to re-organize the text to better emphasize their results, rather the method (as explained below). Briefly, I suggest: 1) detail the types of ice (and rock) dynamics in ice caves; 2) present what exactly you were targeting (ice volume changes, ice movement, rocky talus movement) and 3) discuss the results in a climatic perspective. Some general and technical comments are detailed below:

When discussing ice dynamics, a distinction needs to be made between the dynamics of large (e.g., several meters thick) ice blocks and that of smaller, seasonal ice speleothem. The later respond to day-to-day changes in climatic and hydrologic conditions in caves, whereas the former have a much longer response time (weeks-months-years). Also, the dynamics of the former has two different components: ice melting/accumulation and ice flow. The manuscript deals with the long-term melting/accumulation of large ice accumulations and the introductions stresses this aspect only. I suggest the authors to detail the types of ice dynamics (briefly outlined above) and than explicitly state that they are addressing only one component of it. It would be of great benefit to also discuss the potential usage (advantages, shortcomings, pitfalls) for the other types of dynamics. Also, it should be discussed the potential use for high temporal resolution, as opposed to "high spatial resolution" (page 2, line 1).

The scope of scanning should be discussed in more details, e.g., was the scope to only show that this method is suitable, or was a specific research question being addressed - dynamics in a certain area, dynamics in relationship with position of the ice within the cave, external climatic conditions, possible movement of the ice etc? Also, to improve the quality of the results, I would suggest detailing the types of dynamics and movements that were targeted and discuss the results accordingly: ice dynamics (melt vs. flow), talus movement (moraine-like dynamics vs. periglacial-like rock sliding)

Short comments

P1, L18: ice in caves is dynamic, rather than the caves being dynamic. The term "cave" could refer to the morphological space (walls), that space plus the air inside, the same plus the biota etc, all with a specific dynamics, on scales ranging from millions of years (walls) to seconds (biota, climate, hydrology); hence calling a cave "dynamic" is somehow incorrect

P1, L21 delete "the surface of "

P3, L9 how was the age estimated?

P4, L1 I would not stress the harsh environment as a potential factor preventing tachymetry-based studies of ice dynamics. Such methods have been used for decades, and the usage of TLS in caves is more difficult than tachymetry (as show in the introduction and in references therein...)

P4, l3: "obliquely falling bag" – "descending cave" (or similar) sounds somewhat better

P4, L3-9: this entire paragraph should be rewritten to be clearer. Also, add a cross profile of the cave (not only the map) and add here information on the volume of ice.

P5, L9: "vertical gravitational ice forms" you mean stalactites?

P5, L7-19: this historical paragraph can safely left out. I would discuss in more details the findings of StankovicÌŇ and HorvaÌĄth, 2004

P15, L4: I am not sure I understand the meaning here. Cave floor ice can be identified visually, you mean buried ice?

P15, L5-14 and chapter 4.2. this is one of the most important parts of the text, though it is not well presented and discussed. The information here is based (I presume) on previous observations. I suggest moving this text in the "cave description" section and than, use the TLS data to quantify the dynamics (calculate how much ice has melted/accumulated and see if you could correlate it with climatic conditions outside the cave).

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2019-82, 2019.