The Cryosphere
Discussions

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Interactive comment on "Formation and evolution of newly formed glaciovolcanic caves in the crater of Mount St. Helens, Washington, USA" *by* Linda Sobolewski et al.

Anonymous Referee #1

Received and published: 17 November 2020

* Summary

This paper introduces a cave survey in Mt. St. Helens glaciovolcanic caves (ice caves). It describes the cave geomorphologies, and reports on some temperature measurements taken therein, and some air flow data collected with smoke tracers. The authors then hypothesize about cave formation, growth, and the impact of water and where it may flow.

I'm not sure this paper is currently ready for publication in this journal. I address why under the Major Issues below. Should this work be published here or elsewhere, there are a range of minor issues that need to be fixed, of which some are highlighted below.

* Major

+ L68/69: "This paper provides a general summary to introduce main areas of research and only represents selected parts of our work." This sentence appears correct but I think it might be my biggest issue with the paper. I don't know what parts were unselected, but these selected parts are underwhelming. I apologize for this critique, and it may just be that I'm not the intended audience, or that I'm missing the point. But my takeaway was that this is a decent data description paper, but there isn't much else. I skimmed the Florea (in review) paper that seems closely related to this. I cannot say that this work should just be a site description or Appendix to Florea - it doesn't quite do justice to the scope of the current work. But my feeling after reading this paper a few times is that it hasn't gone very far beyond that, and so I'm not sure of the justification for a Cryosphere publication. I think it could go either way - this work could be scaled down a bit and wrapped in Florea (or in the Stenner "in prep" work), it could be published in a more appropriate journal, or it could have a significant re-write that adds new science, explains how the data presented here can be used to improve a mental, theoretical, or mathematical model of ice caves, karst systems, something cryospheric, etc. As for more appropriate journals, I thought of The Journal of Maps https://www.tandfonline.com/toc/tjom20/current. Note - after writing this I noticed the editor had similar comments upon accepting your submission.

+ L500: No. Just... no. I thought we as a community are past this. Without releasing your data this is not science, just an advertisement for some science you did. Please put all data in a data archive with DOI (I suggest Zenodo) and reference that here.

* General

+ L144: Sensors were not placed randomly but based on "interesting" areas. How did you select these? What does "climatological point of view" mean? How did you know they were interesting before you deployed the sensors? How does this selection effect your results and interpretations?

+ Table 1 and elsewhere throughout the text: Precision is not correct. Do you have high confidence that you know any value here to 1 decimal place? Length to 10 cm? Volume to 0.1 mˆ3? Anything to < 0.1 % or even 1 %?

+ L259 & Fig 10 & elsewhere: "Amplitude scaling and offset translation" - it isn't clear what methods where applied here to create Figure 10(d). Why isn't this normalized 0-1? Or -1 to 1? What is the temperature relative to (what is 0)? You should release the data that went into this figure, and the code to recreate this figure, so I can see how you implemented scaling and translation.

+ Fig 11: If you'd like to suggest things agree, then rather than show time series and ask me to squint and look for patterns, scatter these three lines against each other in a 3D or multiple 2D scatter plots.

+ L465: I suggest "main" or "primary" rather than "master"

* Minor

+ L15: "Air and fumarole" is not precise. A fumarole is an opening where air (heat, gasses, etc.) flow. Are you measuring the fumarole walls? Or the air in the cave and the air in the fumarole? How are you distinguishing between a cave entrance and a fumarole?

+ L32/33: "Import" is mentioned twice. Perhaps "usefulness" is a less hyperbolic word?

+ L35: Unclear: "abundance of loose rock with an average content of 15 %"

+ L67-68: "Our data reveal that these caves show incredible dynamic growth compared to other glaciovolcanic cave systems" I'm not sure this is shown by the current work. Certainly not "incredible". You're attempting to prove a negative and have not presented extensive survey evidence to show lack of growth elsewhere. I'm not sure what this claim adds to the paper. L460-462 are less drastic in the claim.

+ L135: ".kml" -> KML; "ArcGis" -> ArcGIS.

+ Wording and sentence flow is often complicated. Obtuse. An improved version could be easier to read. Perhaps this is just an ESL issue and I commend the first author, affiliated with a German institution, for writing English text far better than I can write any non-English language. I recommend simpler sentences in general. English co-authors should contribute more. Some examples from just one paragraph....

+ L143: What does "adjusted" mean here?

+ L145: "In an analogous manner," It isn't clear what you're analogizing here.

+ "an area with high fumarolic" <- please define fumarolic for the reader. I think this sentence might be missing some words.

+ L148: "expedition only" Only in general should come immediately before the word it is modifying. So "only left" or "only during"?

+ L150: "...a view was observed..." <- awkward phrasing.

+ L151: What is an "implementation"? Specifically the smoke tracer? Or everything described in this paragraph? Simpler phrasing: "All installations were photographed". Better: "All installations were photographed (Sobolewski, 2020)" Where Sobolewski (2020) is a data citation with DOI to the photographs that you've uploaded to Zenodo or some other data archive.

Moving on...

+ L356: "The caves contain fog and reveal a strong humidity" Not sure this is a complete sentence. Again, many sentences read rough like this.

+ L363/364: "Although we equally observed variations over time" I don't know what this means.

+ L367: "Fumaroles furthermore depict a kind of dependency" on what?

+ L408: I don't think you should cite a paper that is "In prep".

+ L429: What is the peculiarity? I couldn't find it in the following paragraph.

+ Several places: "firn ice" is used, but sometimes just "firn". I'm not sure what "firn ice" is - firn and ice are two different things. I think the correct term is just "firn".

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-279, 2020.