

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
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Comment on nhess-2022-161

Edward Bair (Referee)

Referee comment on "Temporal evolution of crack propagation characteristics in a weak snowpack layer: conditions of crack arrest and sustained propagation" by Bastian Bergfeld et al., Nat. Hazards Earth Syst. Sci. Discuss.,
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In "Temporal evolution of crack propagation characteristics in a weak snowpack layer: conditions of crack arrest and sustained propagation" long Propagation Saw Tests (PSTs) were performed over 10 weeks in a well-controlled outdoor setting and analyzed using digital image correlation. Material and dynamic parameters such as crack speed were measured. Single and multi-layer analytical models were compared.

I found this research compelling and recommend it be published subject to technical corrections. The analytical models applied have quite a few new features and the PSTs were substantially longer than in previous studies. The measured touchdown distances of over 5 m and the conclusion that beams must be longer than this distance to study self-sustained crack propagation is important, suggesting that it is nearly impossible for a practitioner, who does not have all day to perform a PST nor such an ideal location, to witness self-sustained propagation. The importance of layered model is well demonstrated.

I have a few minor critiques.

- The authors note that in some cases the "snowpack tended to arrest cracks without slab fractures" but no information is provided about how the absence of slab fracture was measured.
- The choice of column length in all the experiments (Table 1) is not justified. I presume other tests were done before the authors decided to excavate a 9 m long PST? The abstract says that tests up to 10 m long were performed, but the longest column length in Table 1 is 9 m. Please explain.
- Edge effects from the near and far end of the PSTs are discussed, but the edge effect of the width of the PST is only briefly mentioned (as an experimental error on Feb 22 2019). I assume the width of most of the PSTs was 30 cm? This needs to be stated.

- There are at least 2 studies, e.g., Bobillier (2022) and Trottet et al. (2022), that are not publicly available, as they are in review and in press, respectively. By Copernicus standards (https://publications.copernicus.org/for_authors/manuscript_preparation.html), these articles can only be cited if they are available to reviewers, and must be publicly available at the time of final submission.

Additional comments are attached as an annotated PDF.

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Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2022-161/nhess-2022-161-RC2-supplement.pdf>