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Interactive comment on “Weak layer fracture: facets and depth hoar” by I. Reiweger and J. Schweizer

I. Reiweger and J. Schweizer

reiweger@slf.ch

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We would like to thank the reviewer for the constructive suggestions. Below you find a point-by-point reply to the comments.

1) The description of the weak layer should be improved. It is not clear, but it is probably specified in other papers of the Authors, how it is obtained.

The natural samples were carefully cut out from the snow cover on the study plot behind the SLF with a snow saw and directly carried to the laboratory. The artificial weak layers of faceted crystals and depth hoar were grown by applying a strong

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vertical temperature gradient to a layered snow sample. The snow samples for growing faceted crystals consisted of a layer of low density snow (fresh new snow crystals produced by a snow machine (Schleef et al., 2013)) sandwiched between two dense snow layers ($\rho \approx 300 \text{ kg m}^{-3}$); produced by sieving new snow into a box, compressing it and letting it sinter for 48 hours. The layering of the samples is shown in Table 1. The weak layer in the artificial samples was a thin layer of faceted crystals, whereas the natural samples contained a thick weak layer of large depth hoar crystals. We will add this more detailed description of how we obtained the snow samples and what kind of layers they consisted of in the paper (p. 1909).

2) The loading of the specimen should be described in details. For instance, the loading device applies a normal and tangential load that are proportional one to the other and the same applies to the loading rates. Is it correct?

Yes, this is correct, the normal and tangential load are given by $F \cdot \cos \alpha$ and $F \cdot \sin \alpha$, respectively. (The same is true for the loading rates.) We will write this explicitly in the paper (p.1910).

3) Reference at line 25, page 1915 (Bazant et al., FRAMCOS 2004) should be changed with a journal paper (generally easy to find).

We will change the citation as suggested (to Bažant and Pang, 2007).

4) A figure plotting strength vs. slope angle for different loading rates should be added to clarify the experimental results.

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We will add the requested Figure (Fig. 1).

Fig. 1. Strength for sample types TRA/LAY and B over tilt angle for different loading rates (N = 28).

Bažant, Z. and Pang, S.-D.: Activation energy based extreme value statistics and size effect in brittle and quasibrittle fracture, *Journal of the Mechanics and Physics of Solids*, 55, 91–131, 2007.

Schleef, S., Jaggi, M., Löwe, H., and Schneebeli, M.: An improved machine to produce nature-identical snow in the laboratory, submitted to the *Journal of Glaciology*, 2013.

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