The Cryosphere
Discussions

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Interactive comment on "A process-based approach to estimate point snow instability" *by* B. Reuter et al.

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General comments An excellent contribution. Well argued and very well referenced.

Specific comments The relationship between critical crack length and crack propagation propensity could be clearer. Shorter cut lengths in PST tests (assumed similar to critical crack lengths) are not simply e.g. inversely, related to crack propagation propensity. In various papers, Gauthier related validated propagation propensity to cut lengths less than 50% of column length AND crack propagation to the end of the column in a PST test. Statements such as in lines 3-4 of page 5829 oversimplify criticality. One way to clarify this is to define criticality not simply in terms of the start of propagation but propagation over a distance on the scale of 1 m.

Page 5833 lines 10-15. Some clarification of the failure mode in the stability criterion is needed. The shear stress term in the denominator is traditionally slope parallel e.g. Habermann et al. (2008), but this is not the case for strength derived from the SMP (numerator in Eq 5.), which is "an indentation test". A statement that "slope-parallel shear strength over shear stress is not being used because . . ." would be helpful.

Page 5835 line 5 "the FE model reproduced the maximum shear stress very well . . . $R^2 = 0.94$." How do the intercepts from the two methods compare? A statement about the intercepts or a graph would help.

Page 5837 line 5 – 14: If the deflecting beam is never supported by closing the gap between the slab and the bed surface, say so, and note that this may be different from real slab bending over collapsing weak layers.

Technical comments on clarity & presentation Page 5831 line 18: hand hardness index for each manually identified layer.

Page 5833 line 23-24: presumably this because snow is much more sensitive to dynamic stress than quasi static stress. This is worth mentioning.

Page 5835 line 5. Replace "skier" with something like "combined width of two skis" or "width of skier load"

Figure 4 and 6. Some fonts are too small.

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