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Interactive comment on "The influence of edge effects on crack propagation in snow stability tests" *by* E. H. Bair et al.

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This is a very useful paper. Stress concentration due to edge effects potentially compromise all our commonly-used snow tests, so this paper has broad implications. The research is well-done and well-documented. Sample size is good; a major and commendable field effort.

It raises the important question of whether we should revisit our sizing for propagation tests. It would be ideal of course to find a size still small enough to be be done quickly, and with minimal effort and risk; yet also optimally predictive of slope behavior. But it appears that the theoretically optimal size may be too large for practical everyday use.

In that case, might the smaller block sizes still prove useful as predictors of avalanche

days? That is what we are really after. The next stage to suggest might be a two-pronged approach, in which we pursue the optimal size with respect to edge effects, but also test various sizes as simple predictors of avalanche days. While it is far more elegant to have good agreement between theory and testing procedure, what counts most for utility is a test that is a good predictor, even if our understanding of the why is less than ideal.

We know that small tests are at best only simulations of slope-scale behavior. Perhaps the best we can do is better-define their limitations, for more-accurate interpretation.

It might also be productive to try testing and analyzing blocks with the far edge uncut, or trying other alternative configurations, such as wider blocks, or scoring to a certain depth rather than cutting the blocks free.

I do not have suggestions for major improvement at this stage; this work is well-done. The only limitation I see in the data is that the weak layers tested are dominantly faceted grains. This is a common problem to all block testing programs, as it is very difficult to hit the right timing for testing of short-lived instability in new snow, as compared with testing of persistent weak layers that offer much longer time windows. In the next stage, I would make a particular effort to get some tests in unstable new snow for comparison of fracture propagation with the persistent layers.

My other comments are all on details of the presentation, as follows:

One general comment - I would hope the finished layout will move the figures to the pages where they are introduced in the discussion, for easier reference.

Page 232, line 4 - I would like to see a diagram or annotated photo of CECT and CPST tests to clarify their layout without need to dig up the paper referenced.

Page 234, line 5 - Needs a diagram handy and referenced, or a brief explanation, so everyone knows what r sub c is.

Page 234, line 19 - Needs an annotated photo or diagram to show the particle tracking

setup at a glance. A photo would be ideal.

Page 235, line 12 on - Finite element modeling section is good; easy to follow for non-specialists. On line 20 though, I am not finding an explanation of the term beta in the preceding text.

Page 238, line 20 on - The wavelength section indicates a mystery; this is a good thing to bring up. I remember Ed LaChapelle saying that papers that present neat, well-understood results often lead us to far less insight than those that raise unanswered or unanticipated questions.

Page 239, line 1 on - The wave speed section is interesting. It is great to get more data on collapse wave speeds in snow; and the lack of correlation wit density, height, or collapse amplitude is of interest too.

Page 239, line 7 on - Collapse amplitude with time section is good; were there any detectable changes in weak layer thickness, or were the changes only in collapse amplitude?

Page 240, line 12 on - This hypothesis for wavelength discrepancies seems reasonable; worth identifying in the conclusions as a topic for future research.

Page 240, line 25 on - Again, the decrease in collapse amplitude is very interesting, and the correlation with ECT scores also of interest.

Page 242, line 3 on - Conclusions have already been discussed in general comments.

Page 248, Fig. 1 - Should (a) be an infinite plate, rather than finite?

Page 257, Fig. 10 - Captioning needs clarification. Which are a, b, and c?

Interactive comment on The Cryosphere Discuss., 8, 229, 2014.