

Interactive comment on “Current glacier recession causes significant rockfall increase: The immediate paraglacial response of deglaciating cirque walls” by Ingo Hartmeyer et al.

Robert Kenner (Referee)

robert.kenner@slf.ch

Received and published: 16 April 2020

Dear Authors, Dear Editor,

With great interest, I read the paper of Ingo Hartmeyer et al. This valuable study and the Phanatic dataset provide new insights in a poorly investigated research field. Personally, it was an inspiration for me, as we collected a similar dataset over the last 10 years which is waiting for analysis. I had a couple of comments of which the most are of technical nature, they can be found in the attached PDF of the manuscript. There are 3 larger remarks which probably require some more significant changes but I am sure this will be no large challenge for the authors:

C1

1. You did a good job in estimating the accuracy of your measurements. However, I miss something similar for the statistics. Some of the statistical analysis are based on very small sample sizes or are strongly influenced by single events. I wonder if all this is significant and would appreciate something like a sensitivity analysis.

2. The second part of 5.1 when you describe subglacial rock fracturing is not convincing. First you say, that there is no active layer here (I agree with Jan that there is one at least in the upper meters but likely clearly thinner than above the glacier line) and that the melt water refreezes at the surface but then you write, that large amounts of melt water enables frost cracking. How should that be possible from the surface? Important for subglacial rock weathering within a Bergschrund is probably ice-segregation but this is not even mentioned. This leads me to point 3:

3. Section 5.1 gives the subliminal impression that rock wall erosion or at least rock wall weakening is higher in the Randkluff than on a not glacially affected rock. This is however the major question which is not satisfyingly discussed: If I imagine a constant slope and put a glacier at its foot and then I wait for 50'000 years, the rock wall is commonly steeper in the area around the Bergschrund after this time. These steep belts are called Schrundlines and you made a similar observation at your site. Now where does this steepening come from? Is it because the glacier erodes the foot of the rock wall below the Randkluff or does the glacier in contrast protect the rock wall from temperature forcing and decelerates rock erosion while higher erosion rates above the randkluff cause a flattening of the rock wall? Obviously, erosion rates increase after glaciation right? But what is higher? Subglacial erosion or erosion in summit regions not affected by glaciation? Perhaps you can discuss this very basic but unsolved question.

I am looking forward to a successfull publication!

Robert

C2

Please also note the supplement to this comment:
<https://www.earth-surf-dynam-discuss.net/esurf-2020-8/esurf-2020-8-RC2-supplement.pdf>

Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2020-8>, 2020.