

Review of - *How water, temperature and seismicity control the preparation of massive rock slope failure (Hochvogel, DE/AT)*

The authors present a multi-dataset investigation of rock slope failures at Hochvogel on the German/Austrian border, in particular drawing on displacement, meteorological, and seismic data. The analysis shows an interesting variation in the controls on the slope throughout the seasonal cycle. Overall, I find the manuscript to be well written and the data to be useful for this community and recommend publication after minor revisions.

The only moderate point I would like to raise is around the broader implications of the results – which are currently underdeveloped in this manuscript. This is one impact of the current manuscript structure with combined Results and Discussions – but relatively little substantiative discussion around most points. In particular, it would be good to expand some discussion around how the controls on this slope compare to observations from other regions, and how generalizable your findings might be to other slopes. The case study is interesting but has limited impact alone. Figure 1 begins to touch on some of these elements, but you need to revisit this after presenting your data. I would be open to you keeping the current structure, but perhaps with a new sub-heading discussing these issues, or switching to a separate ‘Results’ and ‘Discussion’. You should bring this into the abstract as well.

I will provide some additional line by line comments:

Title: I am not sure ‘preparation’ is the correct term. Perhaps ‘preconditioning’ would be better?

I guess the ‘DE/AT’ refers to countries, but this is not clear. Either spell the country names out in full or remove it.

L1 – Do we have evidence that the hazard is increasing? I don’t see this in the intro. Same for ‘exacerbated by climate change’ – is this always the case and what evidence do we have? May be worth rewording this first line or adding some info to intro.

L2-3 ‘comprehensive driver quantifications’ is very convoluted and I am not sure what it exactly means here. Is there a reason why ‘assessments of preconditioning/triggering mechanisms’ or similar doesn’t work?

L7 ‘drives the system’ – change to more specific wording.

L8 delete ‘Detected’

L12-13 My impression is that this primarily presents and discussed a dataset/monitoring network rather than a methodological approach. If the latter is the intention then some changes are needed.

L13-14 ‘indicates where climate change [...]’ Currently, it explores the current controls but doesn’t really discuss this in any detail. This is where an expanded discussions section could come in.

L14 ‘preparation - > ‘preconditioning’

L16 From my reading not sure if these refs really show increasing risk from rock slope failures due to climate change.

L19-23 I am missing some reference to the scale mismatch between monitoring data and areas exposed to rockfalls. We are currently very far from having the capacity to instrument all/most hazardous slopes and so rely on other methods. This manuscript can contribute better to this with more discussion of broader implications.

L27 'different time scales' – but then you mention different processes rather than timescales.

L29-30 Presumably a trigger acts at failure, by definition. This sentence is currently a little confusing, consider rewording.

L36-41 This whole paragraph seems unnecessary given the figure. The mention of climate change effects is welcome but needs to be developed further / as mentioned could be represented in the figure.

L44 remove 'significant'

L48 'respectively' -> 'specifically'

L61 – why 'prehistorically'?

L81 remove 'massive' and the brackets.

L83 what is 'it' in this sentence. I thought it was 'Hochvogel' but a mountain does not have a magnitude.

L96 'Dominant and outstanding' – review the definitions of these, that description doesn't make sense.

L129 I haven't gone through any code, but I appreciate it being online in an easily accessible and well formatted way.

L145 what do you mean specifically by 'jaggedness'?

L170 and around. It would be good for you to present an ROC curve, or at least in the supplement with some more summary statistics in the main text.

L188 What data gaps. How was this used to fill these? Please explain more.

L189 'Where necessary' – how was this determined?

L196 – 'aggregated to hourly' it would be good to note the original data frequencies here.

L200-203 Some discussion of what this does to the lag time calculations, etc later on would be useful. Also, if a centred rather than trailing window future data is being included in any given time.

L209 Fitted a lin regression how – least squares?

L216 Well introduced -> widely used?

L255 could you calculate the statistical significance of this rainfall effect?

L284 Here discuss more broader context, or in a separate section dedicated to this.

L288 'as described above' -> 'as precipitation'

Fig 5-8c Do your p-values account for the fact that your measurements are not independent due to the smoothing procedure?

Fig 9 Again here – these 'tails' in the scatterplot are characteristic of highly autocorrelated data.

L400 There has still been fairly little comparison with other sites and discussion of broader importance here.

Conclusions – this effectively sums up the findings, nicely done.

L424 'climatic changes that lead to more frequent and intense heavy precipitation events and faster snowmelt' You don't show data anywhere that supports this. Climate change can of course also lead to less frequent rainfall. Snowmelt will not be faster if it is too warm to snow. Etc etc – needs to be supported by data/citations if claiming this.

L425 'stronger environmental forcing' – can you be more specific?

Overall, this paper is a welcome addition to the literature.

-Max Van Wyk de Vries