

Earth Surf. Dynam. Discuss., referee comment RC2
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Comment on esurf-2022-70

Christine Moos (Referee)

Referee comment on "Shape still matters: Rock interactions with trees and deadwood in a naturally disturbed forest uncover a new facet of rock shape dependency" by Adrian Ringenbach et al., Earth Surf. Dynam. Discuss.,
<https://doi.org/10.5194/esurf-2022-70-RC2>, 2023

General comment

The experiments and the results you report are very impressive and valuable. However, the way you present them should be improved to make it more accessible to the reader. Currently, the paper appears as if you just put one measurement / result after another without having a clear "red thread". The implications and especially the links between the different results are partially missing. The soil moisture measurements, for example, seem somewhat out of place and are not clearly linked to the other parts. Furthermore, the title is very specific, in the paper, however, the relevance of rock shape with regards to deadwood is only one element of many. You introduce the topic only "by the way" in the introduction. In line 376 you write "the exhaustive analysis of rock-tree interactions, for both deadwood and living trees [...]". I think this captures the content of your paper well – so write your story around it. The missing focus and structure are also reflected in the number of figures: Eleven figures are completely ok for a paper, but most of them consist of several subfigures and I suggest moving some of them to the Appendix and to focus on the most important ones to avoid an overload for the readers.

On the whole, your results are definitively worth publishing, but I suggest a thorough revision of their presentation and the structure of the paper.

See my detailed comments below.

Specific comments

Title: Why "still" matters?

L1: Sentence "Rates of deadwood production have already increased" sounds very general and I am not sure, whether this fact applies to all regions and time periods. Please be more specific (regarding where and time period > in past few years, decades,...)

L23&24: Consider replacing "ecological" by "ecosystem-based" or "nature-based" (or "green"), to use one of the most common terms in this field

L24: Consider replacing "accepted" by "recognized".

L32: The references for the disturbances seem arbitrary. I suggest deleting them and eventually complement sentence with a reference that underpins your statement (that disturbances have been neglected in models)

L33: It is not obvious, why natural disturbances necessarily have to be integrated in numerical tools, but rather their effect on the protective effect of forest should be quantified (and numerical models can be a tool therefore). This is e.g. also what is done in part of the references (Fuhr et al., 2015, Costa et al., 2021). Please reformulate more clearly.

L74: Why "mass classes" and not "masses"? You report a single weight and not a class

(except for the largest blocks)

L78: Not clear, why the deadwood was removed. Please reformulate more clearly.

L98: Is it general knowledge that an Airbus H125 is a helicopter?

L100: Where were the soil moisture sensor installed (one for entire slope? Several?) (only reported in Figure 1)

L102: What do you mean by "according to their availability"?

L106: I do not think that it is necessary to explain previously used trajectory-reconstruction methods, but to describe the method used in this study and explain why.

L143: How are the classes "soft", "hard",... defined?

L201: Do you mean the mean runout distance with "mean deposition height"? Or is it an elevation and if yes, why? The Expression is confusing.

L203: Is the MDH reduction statistically significant? Did you do any statistical test? It could be interesting to see the actual distribution of runout distances (with and without deadwood) and not only the mean values.

Figure 5: Would be nice to see the boxplots for deadwood and cleared next to each other (per zone). I am not sure whether Fig. c) and d) are necessary – could be moved to the appendix to avoid an "overload" of plots.

Caption:

- In-depth velocity comparison
- ...all screens span the entire width of the slope

L224: Not necessary to mention that a statistical analysis indicated. Suggestion for reformulation: "The mean velocity increased by ...".

L226f: Confusing sentence since you use to reasonings: "Consequently,.. " and "due to" (what is now the reason for what?)

L225: Here again: Did you perform a statistical testing? Are the differences significant?

L233f: This information belongs to the method part.

L248f: Again, you report here methodological details, which should not be part of the Results section.

L255: The equation for the fitted absorption relationship should be moved the Method sections. Only report results here.

Figure 6: Mention difference between a) and b) (Fagus / Picea) in caption.

L298: You begin the paragraph with "experiments were solely held during dry conditions". Later on, you write "while the three experiments in [...] were carried out under rather moist conditions [...]". What is now the case?

L300: Are the exact times of the measurements necessary? I think most important are the measured ranges of soil moisture content.

L314: The correlation between velocity change and VWC seems rather weak, and I am asking myself whether it makes sense to fit a function to the relationship? How good is the fit?

L326: Here again: "deposition heights" is confusing: Do you mean the elevation of the depositions?

L356: Here it comes – but although this new insight on the relevance of rock shape is very interesting, it is only one aspect among many in the study objectives and results and, thus, too dominating in the title in my view.

L388: The (longer-term) effect of the decay of the deadwood on its protective capacity is rather relevant for protective management. Would be good if you could elaborate on that.

L393: You might refer here to Toe et al., 2016 (<https://link.springer.com/article/10.1007/s10346-017-0799-6>) , who conducted a sensitivity analysis on the parameters influencing the energy reduction.

L408: The integration into what?

L450: Sentence unclear. Please reformulate.

L457: The sentence "Such retrieval of kinetic energy was not observed for platy-shaped rocks, because of the greater protection of the standing forest" is not clear to me: is the protection of standing trees only greater for platy-shaped rocks?

L477: As mentioned before, the soil moisture part is not very well embedded in the whole "story" of the article (in particular in the Introduction and Results). Here you raise some interesting aspects, but the link to the protective effect of the forest could be enhanced (e.g., soil moisture probably tends to be higher in forests compared to open land and, thus, this would even increase indirectly the protective effect of forests).

L503: ...protective effect of natural **fresh** deadwood...

L515: Here you briefly mention the temporal evolution of the protective deadwood capacity. As stated before, I think you should discuss this more thoroughly.