

Earth Surf. Dynam. Discuss., referee comment RC2
<https://doi.org/10.5194/esurf-2022-16-RC2>, 2022
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Comments on esurf-2022-16

Anonymous Referee #2

Referee comment on "Rockfall trajectory reconstruction: a flexible method utilizing video footage and high-resolution terrain models" by François Noël et al., Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2022-16-RC2>, 2022

Thanks for this nice contribution and the approach to significantly improve video analyses of rockfall trajectories. I have more or less only small comments.

General comments:

- You state that your analysis procedure has some problems with longer lasting block-ground contacts. Would it help to assume that such longer contact periods are not reflecting a single contact but two single short impacts right one after another? Often, these "double impacts" are responsible for the cases where the COR > 1.
- Would it be helpful for your purpose to rely on existing data regarding camera/lense distortions such as e.g.
<https://argus.web.unc.edu/camera-calibration-database/>
<https://lensfun.github.io/>
- If you have another camera with different viewing angle how much does the (probably) missing synchronization of the different camera influence the analysis?
- Your manuscript almost everywhere uses qualitative expressions only such as "low, high, good, well, higher, lower, longer, slightly, close, ...". I would love it to have also some quantitative values as well. Especially in the discussion section. This would lift the quality of the article to a higher level.

Specific comments:

L33: Maybe, you can add references to these two software tools?

L36: Maybe, you can emphasize more clearly that the concept of COR in rockfall trajectory

modelling probably is a model only. The rocks themselves almost don't jump (just let a rock drop and observe almost no rebound). So, the COR approach is not reflecting the correct physics behind but compensates the natural edges and corners of blocks and underground that force the jumps.

L56: The posterior analysis of traces in the field might deliver good restorations of trajectories. Of course a lot of work but often necessary for example in case of heavy damages. Suggestion of additional publication regarding physical trajectory parabola analyses

- Gerber, W. (2019). Naturgefahr Steinschlag-Erfahrungen und Erkenntnisse. Eidg. Forschungsanstalt für Wald, Schnee und Landschaft WSL, Birmensdorf. WSL Berichte, 74, 149.
<https://www.dora.lib4ri.ch/wsl/islandora/object/wsl%3A19475>
(in German only, relevant pages 17-22, 33-54)

L62ff: The advantage of the blocks of Caviezel et al is their regular shape. This eases the determination of the centre of gravity.

Caption Fig. 1: "minimize" --> "minimizes"

L134: Till which travel speed would you recommend that the air resistance is still neglectable?

Equations 10-11: Maybe, you have to explain the difference of these two CORs in details. Most readers usually know COR_t and COR_n only.

Figure 3: Can you somehow visualize in the figure that the relation between pixels and nature changes also for the different sections of a recorded image due to lens distortions and the geometry?

Caption Figure 3: "helps distinguish" --> "helps to distinguish"

Equation (21): The letter "a" has already been used for the acceleration. Maybe, you want to change it?

L603: "helps save" --> "helps to save"?

Figure 9: The two diagrams are difficult to read. I don't know whether I understood them right, but if so then I would recommend:

- Remove "segment above"
- Integrate Fig.9a,b,c, etc
- Remove CAVR and SLF 2020

L488 and others: "Fig." --> "Figure" if reference to a Figure is used within the text. Abbreviate "Fig.". only if used within brackets.

L535: remove comma after "Caviezel"

Suggestion of additional references regarding video analyses in the field of rockfalls but using definitively "antique" techniques:

- Glover, J., Denk, M., Bourrier, F., Volkwein, A., & Gerber, W. (2012, April). Measuring the kinetic energy dissipation effects of rock fall attenuating systems with video analysis. In *12th Congress INTERPRAEVENT* (Vol. 1, pp. 151-160). http://www.interpraevent.at/palm-cms/upload_files/Publikationen/Tagungsbeitraege/2012_1_151.pdf
- Glover, J. M. H. (2015). *Rock-shape and its role in rockfall dynamics* (Doctoral dissertation, Durham University). <http://etheses.dur.ac.uk/10968/>
- Volkwein, A., Brügger, L., Gees, F., Gerber, W., Krummenacher, B., Kummer, P., ... & Sutter, T. (2018). Repetitive rockfall trajectory testing. *Geosciences*, *8*(3), 88. <https://www.mdpi.com/2076-3263/8/3/88/htm>

References:

- The first two references contain author's institutions in brackets. I think these can be removed?
- Volkwein et al (2011) is mentioned a couple of times in the text but is missing in the references list. Please, add.
- References Garcia (2019) and Sanchez+Caviezel (2020) miss information on where these references can be found. Please, enhance.
- The usage of "last accessed" currently is inconsistent with the different links provided.