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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Brief communication: Remotely piloted aircraft systems for rapid emergency response: road exposure to rockfall in Villanova di Accumoli (Central Italy)" *by* Michele Santangelo et al.

Anonymous Referee #1

Received and published: 2 September 2018

The paper focus on the analysis of the earthquake-triggered rockfall that occurred along the SP18 in Villanova di Accumoli (Lazio, Central Italy) during the 24 August 2016 seismic sequence. The Authors have used a Remotely Piloted Aircraft System for the acquisition of an image sequence to produce digital models and orthophotographs of the topographic surface with a final aim of identifying and characterizing the source areas of unstable blocks. Then, a detailed modelling of the potential rockfall trajectories allowed them to map the rockfall hazard and to assess the related risk. Results showed that only a part of the road hit by the rockfall can be exposed to further rockfall impacts

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and a limited part of the simulated trajectories reaches or crosses the road. Based on these data, limited protection measures were suggested. The topic of the paper is very interesting since the use of Remotely Piloted Aircraft System for the acquisition of data to model the topography, to identify the rocky unstable blocks and to simulate the potential fall trajectories plays an important role in rockfall risk assessment and in protection measures choice. I appreciated it. Maybe an additional RPAS flight with photos taken orthogonally in respect to the slope face could have allow a better identification and characterization of rocky unstable blocks and source area for rockfall modelling.

The research design is anyhow quite appropriate. The interest to the readers is good but I want to underline that Authors have data to re-submit the paper in an improved form. The English language and style are in general appropriate. In general, the figures are simple, quite clear, properly cited in the text even if they present some errors (Please, see additional comments in the attached *.pdf file).

Nevertheless, several weak points are present. The accuracy of DTM below the trees is the most critical part of the research: if the DTM has a low accuracy still has a real meaning the modelling of rockfall in STONE? Why do the Authors not have measured additional and more accurate GPS points in a different manner? Why not using a Total Station to increase the GCPS number and their spatial accuracy? An alternative to this could has been to fly in autumn or at the end of winter time in such a way to have a reduced vegetation cover. By this way, for sure, the efficiency of the RPAS flight could has been greater even if the value of immediacy with respect to the emergency would have been lost. This last sentence links to another weak point: Authors declared that none of the published papers, to the best of their knowledge, focus on “testing a procedure that guarantees semi-quantitative information in a relatively short time to provide an evaluation of the residual rockfall risk during emergencies, when time and budget constraints are restrictive”. Before the Conclusions the Authors affirm that the entire procedure was estimated in about 15 working days of one person which is trustworthy but I wonder if does respond to the emergency times. If not, the presented

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procedure is correct but not very original and it limits itself to a common application of rockfall studying and modelling as several papers already do. Within the paper Authors affirm that the RPAS flight was done on October 10, 2016 while the earthquake is dated August 24, 2016.

Additional remarks: âĂć The spatial accuracy of GCPs measured by GNSS RTK VRS method, is low (about 10 cm) when usually, using that methodology, a spatial accuracy lower than 5 cm for a single point is achievable. âĂć The back analysis of the rockfall modelling (i.e. calibration phase) is missing and it could have allowed to improve the trustworthiness of results. Rockfall data calibration is routine in such applications, and in scientific papers is necessary. Moreover, Authors have data to do it on the basis of the earthquake-triggered rockfall of the 24 August 2016 seismic sequence. âĂć A geological map, that would have been useful, is also missing. âĂć Finally, Highlights and Keywords, maybe not required for a Brief Communication of NHESS, are missing.

Please, see additional comments and suggestions in the attached *.pdf file

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-177/nhess-2018-177-RC1-supplement.pdf

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