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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Dynamic risk simulation to assess risk along roads" *by* J. Voumard et al.

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General comments:

The manuscript by Voumard et al. presents an innovative method for more fully quantifying risk associated with rockfalls on mountain roads. By acknowledging that vehicles tend to travel more slowly on winding mountain roads, the authors demonstrate that using a dynamic traffic simulator can improve the accuracy of risk assessment over methods using the average number of vehicles on a length of road. The authors select three road sections in Switzerland subject to different geologic hazards (debris flows, landslides, and doline collapses) where considerable traffic data are available.

The dynamic traffic simulator employed in the analysis yields results that may be understood by decision makers, for example the finding that optimizing the position of

traffic lights can reduce risk by as much as a factor of two. It also makes clear that in some instances the dynamic traffic simulator is better used to identify areas where constructed mitigation measures would be the most effective way to reduce risk. These are substantial conclusions with important practical applications.

This manuscript should have broad appeal to readers of NHESS looking for ways to assess risk from rockfalls and other geologic hazards on roadways. I recommend publication following minor revision.

Minor comments:

- The authors highlight risk from rockfalls in the introduction, but for the Fontanney road section the primary hazard is debris flows, and for the Col du Pillon road section the primary risk is associated with doline formation in the roadway. The authors may want to generally characterize the hazards as "geological hazards" rather than as from rockfalls specifically. If so, the details about rockfall hazard assessment discussed in the second paragraph of the introduction are probably excessive.

- It is nice to see that actual traffic data (e.g., hourly fluctuations of traffic flux on the roadways investigated) are utilized in the analysis. The authors may want to briefly discuss how their methodology could be adapted to situations where such detailed data are not available.

- It would be helpful to expand Table 3 to include all parameters used in the analysis (e.g., visibility, distance limits), and to ensure that the parameters listed in the table are labeled consistently with their description in the text. This would increase the reproducibility of the analysis.

- "Vehicles" is often used where "vehicle" would be the more appropriate usage.

- The Appendix is listed as "Appendix 1" in the text (line 124), but is labeled as "Appendix A" on line 337. Please ensure consistency here.

- Figure 7: Change "poucentage" in the y-axis label to "percentage".

- Figure 8: Unless the authors feel strongly that this figure should show the Matlab format, I recommend reformatting to focus on the data, cropping the toolbar and other unnecessary aspects out of the screenshot. The label “Figure 2” at the top of the screenshot is also potentially misleading.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1285, 2013.