

## ***Interactive comment on “Brief Communication: On direct impact probability of landslides on vehicles” by P. Nicolet et al.***

**P. Nicolet et al.**

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Thank you very much for your comments. Please find below an answer to each question or remark (questions or remarks are in italic, whereas answers are in bold).

*general: The approaches described assess the problem in a spatio-temporal context taking into account only geometric values and time. Thus "center of mass" should be replaced by "geometric center".*

**We agree, it is more accurate.**

*p. 7312, line 26: delete "that"*

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**OK**

*p. 7314, line 11 to 13:  $L_H / v_v$  is denoted as temporal probability. However,  $L_H / v_v$  is the time a vehicle needs to cross a hazard zone.  $L_H / v_v \times f_v$  is*

- either a temporal probability, since it is the time a number of vehicles need to cross the hazard zone per time unit*
- or a number of endangered (from a temporal point of view) vehicles.*

**$L_H / v_v$  is indeed the time a vehicle needs to cross the hazard zone, and it is only this part of the equation which is a temporal probability. Indeed, it is the probability for a vehicle crossing the hazard zone once per time unit (e.g. year) to be in the hazard zone at a given time. This ratio is then multiplied by the vehicle frequency. As you mentioned, the result of this multiplication no longer a probability, but is the expected number of vehicles in the hazard zone at a given time. On the other hand, the final result of Eq. 2 (i.e. after multiplying the previous result by the spatial probability of Peila and Guardini 2008), which is similar to Eq. 1, is a probability as long as the assumptions are met (dimensionless falling mass and single traffic lane with no car overlap).**

*p. 7316, line 4: If " $W_E$  (is) largely superior to (please replace by: extremely larger than)  $L_V$ " (line 13),  $P_S = W_E / L_H$  is the spatial probability if the width of the event is assumed to be full of vehicles (worst case scenario?). Compare formula (2) spatial probability =  $L_V / L_H$  and formula (4).*

**OK for extremely larger. When it comes to  $P_S = W_E / L_H$ , it is actually not related to the vehicles.  $P_S$  gives the probability that an event occurring in the hazard area reaches a given point of this area, disregarding the presence or absence of potential elements-at-risk. This parameter is then a spatial probability. However,**

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it is not related to the spatial probability defined in Eq. 2, and we understand that it might be confusing. We will try to clarify this point by warning the reader that these two spatial probabilities are different concepts.

*p. 7315, line 27 to p. 7316, line 8:  $P_{ST}^*$  is not a spatio-temporal probability. It is, however,*

- *either a temporal probability, since it is the time a number of vehicles need to cross the hazard zone per time unit*
- *or a number of endangered (from a temporal point of view) vehicles.*

**We agree. It is actually the same for  $P_{ST}$ , as described on p. 7316 (l. 18–20). We will rephrase this sentence by saying that both  $P_{ST}$  and  $P_{ST}^*$  are not probabilities. However, since the goal of this article is to discuss the different methods use to calculate the spatial and temporal coincidence of an event with one (or several) cars, we thought that keeping a constant name for this parameter would be the best solution. An other option would be to leave the vehicle frequency out of  $P_{ST}^*$  and  $P_{ST}$ , which would then be probabilities (see the answer to your third question). However, since the vehicle frequency is generally included in this parameter, it would complicate the comparison. Therefore, we think that calling this parameter a probability and warning the reader for this misuse of term is the best option (It has to be mentioned that this parameter is not presented directly as is in the cited articles, which means that the responsibility for this misuse of term is ours).**

*p. 7316, line 11 to 20: This paragraph is hardly understandable. Please rephrase. Indeed. we will clarify this paragraph.*

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*p. 7317, line 23: hicker's = hiker's?*

**Yes**

*p. 7321, line 20: rock fall debris*

**Ok**

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