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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Shallow landslides stochastic risk modelling based on the precipitation event of August 2005 in Switzerland: results and implications" *by* P. Nicolet et al.

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Thank you for your comments, an answer to all comments is given below. Questions or remarks are in italic, whereas answers are in bold.

[p. 754, l. 2] The Introduction seems to be untied from the later description of the work. In particular, terms used in Eq. 1 are not cited in the following text.
The idea of this section is, starting from the commonly used equation, to describe the similarities and differences induced by the methodology used in this

paper. Nevertheless, we will rework on the methodological part to clarify how our study fits into the literature, in particular with respect to the equation.

[p. 754, l. 22] Is this the frequently cited "intersection probability"? If yes, why don't you use $P(S|L)$ anymore in the text?
Not exactly. $P(S|L)$ usually refers to the probability, for a landslide whose initial localization is known, to propagate to the element at risk. Therefore, from a given initial probability, this terms generally degrades this initial probability downwards or laterally from the initiation point. When it comes to our approach, the intersection probability is considered in a boolean way, which means that $P(S|L)$ is 1 inside the 100 m radius circle and 0 outside. This is still compatible with the $P(S|L)$ term since degrading progressively the initial probability is not mandatory. So the term would be similar if the precise location of the landslide was known in our methodology. Indeed, the location of the landslide is, in our methodology, assigned in two steps. First, the landslide is attributed to a cell and then the landslide is (fictively) randomly located somewhere in the cell. As a result, since the localization inside the cell is fictive, the intersection probability is the integration of $P(S|L)$ over the cell for all houses and landslide locations. To summarize, the intersection probability is used to decide if the landslide attributed to the cell, but without an exact location, will affect a house or not. We will rearrange this part to be more audible.

[p. 755, l. 15 and all over the article] 1 km x 1 km= 1 km2
That is correct. We changed the notation during the typesetting process from "1 km2" to "1 km2 x 1 km2" instead of "1 km x 1 km". This last notation will be kept.

[p. 756, l. 1] 25.3 mm
OK

[p. 756, l. 19] Fig. 5 is not a multi-dimensional "cumulative matrix", but is just a "stacked column" plot.

The stacked column plot is used to illustrate the matrix content. The matrix is 3-dimensional in the sense that for each cell of the map (with xy coordinates), 4 numbers are stored according to each lithological type (these 4 numbers represent the "z" vector). "Cumulative" means that, if the proportions of the cell covered by the different lithologies are respectively 20%, 25%, 0%, and 55%, for example, the stored values will be 0.2, 0.45, 0.45 and 1. We will try to find a better figure to illustrate this matrix.

[p. 757, l. 20] is

Thanks

[p. 757, l. 28] of what?

Of the distributions of the number of landslides according to the precipitation class and lithology, as well as the damage costs distribution

[p. 758, l. 12] landslide

OK

[p. 758, l. 25] it takes

OK

[p. 759, l. 18] Please, replace: "The expected damage cost, x, for a given building..."

You are right, this is clearer, we'll use your formulation.

[p. 759, l. 21] What does it mean that x is less than 0?

This is the general notation of the exponential distribution. It means that the probability for x to be below 0 is null. See for example Ross (2010), p. 208.

[p. 759, l. 22] The first moment of the distribution should be $1/\lambda$.

That is correct, we'll change the sentence like that: "The distribution is only defined in terms of its first moment $1/\lambda$, which is equal to $\bar{x}$, namely the expected ..."

[p. 761, l. 1] you should define your gamma distribution.

Ok, we'll include that in the next version

[p. 765, l. 11] 2

Ok

[p. 766, l. 5] fit

Ok

[p. 780] stacked column plot

See above

[p. 782] inventory

Thanks

[p. 782] arrow?

That is right, we'll add one

[p. 783] arrow?
That is right, we'll add one

[p. 786] You probably need to have less classes for a better representation of these four plots.
There are many classes in order to identify the progression on the higher classes, since we kept a constant quantile interval. But, we could aggregate the classes with low precipitation amount, that contain no or almost no landslides, since only the 4 or 5 higher classes are really significant for the landslide distribution. Indeed, keeping a constant quantile interval is not necessary.

[p. 786] different
Ok

[p. 790] The legend is missing in these three graphs.
The colors are explained in the legend, but for greater clarity, we'll add them on the graphs

[p. 790] This is not clear: the number reported in the text (p. 762) are different.
The numbers in page 762 refer to the number of affected buildings of the event, that we estimated using the landslide distribution map and the intersection probability map. The landslide maps generated by the model produce less intersection (i.e. hit buildings) than the actual landslide distribution. In fact, the number of affected buildings corresponds to the second number (1860), which is a rough mean of the simulation made with raw data (1880.6) and gamma fits (1844.6). We will replace this 1860 number by the two results, which should be less confusing.

[p. 790] buildings
Thanks

References

Ross, S. M.: A first course in probability, 8th edition, Pearson Education, Upper Saddle River, 2010.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 747, 2013.