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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Potential and limitations of risk scenario tools in volcanic areas through an example in Mount Cameroon" *by* P. Gehl et al.

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I have found the topic of this paper very interesting. However, I think that the adaptation of the tool (originally designed for seismic risk) to volcanic risk should be more clearly explained, as well as the example of application to Mt. Cameroon.

General comments

1.- The system used is an adaptation of a seismic risk scenario toolbox and a great part of the paper describes this toolbox. The description of the new modules added to the tool by the authors (whose functionalities are listed in 1087:6-10) does not clearly show from my point of view which is the relevance of the contribution of the authors. Comments to each point: (a) merge the damages due to different volcanic phenom-

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ena. Although the authors discuss the computation of damage over degraded assets (2.6 section), stating that the current state of the literature does not account for state-depended fragility models. They describe an inventory removal algorithm, where the final damage of an object is the maximum damage caused by individual phenomenon. As I understood from the text this is equivalent to compute one damage map for each event and combine all of them keeping the highest damage for each asset, not a computation of successive damage of a multievent. The main advantage of this procedure is saving computational time (as an asset is removed when it is totally destroyed), but it does not evaluate the possible consequences of a multihazard event like the scenario proposed in the paper. (b) include various forms of vulnerability models (from deterministic damage matrices to probabilistic fragility curves. As I have understood, the original tool for seismic risk includes both possibilities, so the improvement made by the authors consist on adding to the tool different vulnerability models, listed in table 1, that consists in one damage matrix for tephra fall on different assets, fragility curves for the same hazard on different assets and the simplest vulnerability model (affected=destroyed) for the rest of hazards. (c) estimate potential damages to cultivated areas and crops. I have understood that this means adding a new asset (and its corresponding vulnerability models, included in point b)

2.- The authors use a volcanic scenario that is only qualitatively described. I would expect both a description of the numerical models used to compute the scenario and the input parameters selected (some of the input parameters are critical e.g. the location of the vent for lava flow hazard or the wind field for tephra fall hazard). I also think that a figure showing the multi-event numerical simulation is an absolutely necessary complement to the damage maps). I would also appreciate

3.- Table 2 summarizes the damage results obtained. It seems surprising that all the buildings are completely destroyed, so I think the surfaces refer only to the damaged buildings, affected by lava flows, debris flows or lahars (vulnerability 100%). But in the second item of the table (roofs) all the (damaged?) roofs are also completely

NHESSD

1, C359–C361, 2013

destroyed (damage=1), are they destroyed by roof collapse due to tephra fall? Or are they destroyed because the buildings were previously destroyed by other phenomena (lava, landslides...)?. I think this table should be clarified (maybe for example adding the ratio of damaged/non damaged built area, length of power lines... etc.) and the results discussed in the text. I would also appreciate information on which hazard destroyed the assets, maybe just addition of the map suggested in my second comment on the areas affected by each hazard would be enough to give an idea on this.

I have also found that the references contain too many reports of European Projects (even there is a reference to the main web page of SYNER-G project, without any specification of where to look for the referred information), reports of organizations like GNS or BRGM and a reference to proceedings of a National meeting. Unfortunately, most of the references to the seismic risk tool this work is based on are in this group of difficult access documents or non peer-review publications. Therefore, it is difficult for the reader to understand the functionalities of the original tool and evaluate the significance of the modifications for its use in volcanic risk.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1081, 2013.