

## ***Interactive comment on “Assessing road segment impact on accessibility to critical services in case of a hazard” by Sophie Mossoux et al.***

**Anonymous Referee #1**

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The paper analyses the impact of a hazard on the road network using two metrics, (i) road accessibility risk and (ii) road hazard exposure. The first combines the road segment's potential impact on the accessibility and travelling time of the population to the closest infrastructure (“road access vulnerability”) with the probability of occurrence of the hazard (“road hazard exposure”). The second metric considers the reliability of the alternative path the user needs to follow in case a road segment becomes disrupted. The content of the manuscript fit the scope of the journal. The structure is good and the argument analysed is interesting and novel. Despite some limits of the analysis due to many modelling assumptions, anyway well discussed and argued by the authors themselves, in my opinion the paper can be accepted to the publication on NHSS with some minor integration. The greatest doubt is in the way in which the Road Hazard

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Exposure is estimated. In the chapter Road Hazard Exposure authors state: “referred to as susceptibility here, is defined by summing up the normalized probability values of all pixels underlying the road segment, the exposure to hazard is strongly influenced by the segment length (Figure 7). Short segments as observed in the capital and in most villages (e.g. Koimbani - Figure 7) will have low susceptibility values, even if the area is highly exposed”. Instead of the sum of the probability value on the road segment, others metrics to evaluate the susceptibility could be more appropriate (ie. assigning the modal value of the probability to the segment or an x percentile of the probability) producing a result without anomalies related to the high influence of the segment length. I would like authors reply to this remark also in the paper, or better, they could try to use an other metric to estimate the road hazard exposure also in the analysis. An other issue is related to the value assigned to the road in the northern part of the island. Since the analysis is restricted to the lava flow produced by the Karthala volcano, in the roads of the northern part the value should be “not applicable” and not “no hazard”. I do not think it is acceptable assign the value “no hazard” since in the northern portion of the island there is another volcano, which could subject the streets to lava flows. In figure 3 it seems that the roads and inhabitants in the northern part of the island would not be affected by the lava flows of the Karthala volcano.

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