

## ***Interactive comment on “Vulnerability analysis in Complex Networks under a Flood Risk Reduction point of view” by Leonardo B. L. Santos et al.***

### **Anonymous Referee #1**

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#### General comment:

In general, the work is too abstract, non-informative, and thus it is impossible to regenerate and validate the results. The proposed methodology is not innovative either as there are many researches devoted to the application of graph theory to vulnerability assessment of network infrastructures (transportation, power grids, water distribution pipeline, tank terminals, etc.).

#### Major comments:

1. The authors seem to have mistaken the criticality (importance) metric for the vulnerability metric. For instance, the relationship presented in Equation (1) is so much analogous to the Fussell-Vesely importance measure used in cut set analysis, or the

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definition given in line 25 is close to criticality of an element rather than its vulnerability. I think the authors need precisely define what they mean by vulnerability before they apply it to their case study. 2. Despite its heading, Section 2.1 does not provide any information about the transport network of the area under study or the severity and characteristics of potential floods. 3. I am not sure about the accuracy of Fig. 1 because, (i) only one segment is identified as the most vulnerable segment (denoted with color red) in such a complicated network of roads, and (ii) there is no second most vulnerable segment (denoted with color orange). 4. The conclusions are not well supported by the study. For instance, how have the authors concluded, without any sensitivity analysis or validation, that their proposed vulnerability metric is a good proxy of the potential impacts of floods?

Minor comments:

5. The manuscript's English need proofreading; there are many typos, grammatical errors, etc. 6. The manuscript's title is inaccurate since the work is only focused on transportation network not all other types of complex networks. 7. Caption of Fig. 2 is missing. 8. Line 29-30: what is meant by "vulnerability approx."? 9. Line 18: since the work is about critical infrastructures, the definition of "people/group vulnerability" is rather irrelevant.

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