Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2019-409-RC1, 2020

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Network-risk: an open GIS toolbox for estimating the implications of transportation network damage due to natural hazards, tested for Bucharest, Romania" *by* Dragos Toma-Danila et al.

Anonymous Referee #1

Received and published: 20 January 2020

Overall, this is an important paper on earthquake exposure risk of road networks in Bukarest. The novelty being an up to date study on this earthquake prone city - important also for international fellow researchers to compare their approaches and advance. Very explicit and useful maps, and tables making their approach transparent.

Language should be edited by a native speaker or professional editor.

Minor comments: Page 1 Line 26: More recent source than 2008 would be good to add

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Section 2 Line 99: I suggest avoiding suggestive expressions such as "is at first sight easy to follow" I guess, an -s is missing for "comprise"

Line 107: This needs more detailed explanation - what exactly is novel here? Level of serviceability, random network analyses etc already do exist?! The following sentences up to line 116 are fine, but still, what is novel about this? Maybe: few conducted studies on multiple hazards and specifically, in Bukarest...

Paragraph around line 125: reconsider wording, length of sentences and maybe, grammar. Also further down below, for instance, Lines 153-154 You state "A probability of 100% for a network segment would indicate certain blockage - very hard to consider for a transportation network, but worst-case scenario could use this value." What about single roads, dead end roads, last road segments before a harbour, hospital emergency entrance, airport etc.? Many more section, just an example: Line 190

What is missing a bit in section 2 is discussion of alternative models, such as QGIS, GRASS or A* algorithm - but mights also be taken up in the discussion chapter. So far, it looks rather that Dijkstra was selected as only available algorithm.

Regarding the structured research questions (which I think are fine by themselves) it could be reconsidered how much they fit to a) section 2 and b) the following assessment. For section 2, it would be good to know what the authors consider as "vulnerability" (of the road, of users. etc.), and "socio-economic" - why were no research mentioned on this specifically before to guide the reader that this aspect is in fact most relevant. And to the very last question segment - maybe add a methodology short description of state of the art location-allocation analyses?

It is a bit unusual to have methods both in 2 and 3.1 sections - maybe reconsider merging it and separating the results? 3.2 I suggest starting not with such a detail sentence but rather coming back to the research questions and following their structure, or, the nice structure/steps laid out in section 1.

Section 3.2 is written largely for experts familiar with such methodology, which is fine. However, some more structure could help, such as following the research questions. Also, an intro part easier to understand for non-experts. For the experts then, more explanation on why certain values were decided on such as 30min service area (would that be enough to save lives? (Make sure to match it also with Table 3 - 25mins...)Which sources support this "long" time - being more realistic to earthquake debris routing maybe, but following which estimations, sources, previous studies?). The same for weighting: it is common for modellers to pick weights themselves and the explanatory sentence is fine, however, the mobile rescue teams might not have the same resources treating >1000 wounded and might be blocked by the debris - any sources supporting this?

A discussion chapter is missing - the authors have decided to mix results and discussion / rather commenting of methodological steps. The paper would benefit from a sub-section on shortcomings and recommendations for fellow researchers regarding methodology, maybe also a sub-section how the study matches with current similar studies - or not and provides novelty. Conclusion (and maybe discussion) could also make good use of the structure of research questions.

While the text is well-written and the professionalism of the assessment and knowledge about the literature out of question, the text could use a bit more structure here and there, as in the long section texts in 2 and 3, for example. Setting key terms per paragraph in italics could be an option to guide the reader, or sub-sections, or summarizing flow-charts.

What is missing a bit, at least conceptually, (it must not all be analysed within one paper): the perspective of affected people or customers of roads and logistics/critical infrastructure. They also interact with roads and their usage (see Rinaldi et al. 2001), be it through geographical, physical or logical interaction. The article starts with a good understanding of the recent trend of balancing hazard and vulnerability, but then focuses too much on the exposure only. Maybe it would be sufficient expressing this

demand more in chapter 1 and 2 and ... a bit, then it should be fine.

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