

Interactive comment on “Development of fragility curves for railway ballast and embankment scour due to overtopping flood flow” by R. Tsubaki et al.

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Comments 2-1: This is a review of “Development of fragility curves for railway ballast and embankment scour due to overtopping flood flow”. My comments are below, but in no order of importance. Many are to do with structure and how the argument is presented. General comment: This journal NHES is not an engineering one, therefore the authors need to do as much as they can to ensure the paper is (i) readable by non-engineers, (ii) wherever possible, relate their results to general process, uncertainty, etc., to do with floods. They do some of this (e.g., introduction, conclusions) and a bit more throughout would help.

Reply: We'd like to express our sincere thanks to the referee for carefully reading the manuscript and for providing constructive comments on the readability and suggestion

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to enhance discussion on generality/severalty.

Comments 2-2: Referencing. In many sentences it is clear where information/facts/ideas are from in terms of in-text citations. But, in a number of sentences, it is not clear. Can the authors go through all of the sentences and ensure that any facts or information that are not common knowledge, it is clear 'how' we know this? For example “In Japan, rapid population decline is another factor exacerbating risk to railways in many regions, as the amount of money available for maintenance and upgrade of these railroads is shrinking together with the amount of customers and goods they serve to transport.” How do we know there is a rapid population decline? How do we know about the amount of money? These are facts being stated, but unclear how we know these. There are a number of examples like this.

Reply: We will add references supporting the descriptions.

Comments 2-3: Financial amounts. Any where that actual 'dollars' or other financial amounts are stated, it is important to state what year these amounts are from (are they the year of the source, or another year) due to inflation.

Reply: The valuations in table 1 are the approximate values from the widely-used FEMA HAZUS damage prediction model. The HAZUS manual does not state a specific year for these values, so the year of the manual's publication is assumed. The description in the text will be revised.

Comments 2-4: Grammar. This could use some work, although was not poor. For instance, avoid contractions (it's becomes it is).

Reply: Contractions will be revised.

Comments 2-5: Structure. Some better work could be done on the structure. Particularly the introduction, which was long (not a problem) but as a reader, I was not sure what was coming. Can a better organisation or signalling of what will be done be put into the introduction?

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Reply: We will rearrange the structure of the introduction to improve readability and flow of sentence/paragraph.

Comments 2-6: Figure Captions. Please make it clear where the source of any photos or figures are from. If it is the authors fine. But, if it is based on data from elsewhere, or pictures/figures from elsewhere, please put this in the figure caption. For example, Figure 3, the aerial photo is from whom? What year is the aerial photo? For the left hand part, how did you extract the drainage network, or is this from someone else? Make the figure caption self standing so we know how it was done and where the data/information is from.

Reply: The explanation for the figures will be extended.

Comments 2-7: Hydrological model/hydraulic model. There were very few details on this, so I had no idea of what was done. Just stating 'personal communications' is not enough.

Reply: We will add explanations about the methods.

Comments 2-8: Section 2. This needs an introduction. Why bring in the target events? What is the purpose of this section?

Reply: We will revise the end of section 1 and the beginning of section 2 to improve the connection between sections.

Comments 2-9: Equations. These were not the easiest to follow because of the typesetting. So for Eq. (1) it was unclear if the 'a' was part of the expression 'a- u'. Please be more careful in typesetting. I recently published a paper in an EGU journal, and they have a very helpful section under the 'author guidelines' on equations, variables, etc. Other: Please ensure there are no 'assumptions' for the reader. So for example, is in the natural log, if so, state it.

Reply: The style of equations 1 and 2 will be revised. The definition about "ln" (logarithmus naturalis/natural logarithm) will be added in the manuscript. We searched

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guideline of EGU but could not find the page except http://www.natural-hazards-and-earth-system-sciences.net/for_authors/manuscript_preparation.html where not guidelines about equations are included. Could you send us the URL? And we afraid to accepting the style for the different journal.

Comments 2-10: Variables table. You have so many variables, please put in a table, early on, and refer to it, with variables, variable name, units, and equation introduced. This will help the reader.

Reply: We know some journal has a style to include such notation, however we couldn't find regulation in NHSS journal asking to include such a table (Fig. 1), and we afraid to disrupt the style of the journal. Is the following table acceptable?

Comments 2-11: Figure 6 caption. I assume the straight line represents 1:1. If so, state this.

Reply: The description about straight-line in Figure 6 will be defined in the figure caption.

Comments 2-12: General. Make sure the uncertainty is clear throughout along with the confronting of your model with other models. You clearly address uncertainty in some places, but I'm not convinced this model is better than others that are out there after reading the paper, nor am I clear that I know strongly what the other models are out there that this one is being confronted with.

Reply: We are not aiming to develop a model that is better than other models. Rather, we are applying standard hydraulic models to develop fragility curves for railway embankments. There are no such railway fragility curves in existence in the literature, and our research is the first attempt to do so. Introduction will be revised to make clear this point.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2016-167, 2016.

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Variable/constant	Definition [unit]
g	Gravitational acceleration [9.8 m s^{-2}]
h	Water depth [m]
i	Slope [i]
n	Manning's roughness coefficient [$\text{s m}^{-1/3}$]
q	Discharge per unit width [m^2/s]
S_{ox}, S_{oy}	Bed slopes in x and y directions [-]
S_{fx}, S_{fy}	Friction slopes in x and y directions [-]
t	Time [s]
u, v	Depth averaged velocity components correspond to x and y coordinates [m/s]
x, y	Horizontal coordinates [m]

Fig. 1. Example of variables table