

Interactive comment on “Potential future exposure of European land transport infrastructure to rainfall-induced landslides throughout the 21st century” by Matthias Schlögl and Christoph Matulla

Anonymous Referee #2

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GENERAL COMMENT

The article presents an evaluation of possible future variations in the overcoming of an already-defined rainfall threshold for landslide occurrence in Central Europe, as a result of the application of an ensemble of downscaled climate projections, with particular regard to roads and railways.

The paper is clear, sufficiently well-written and potentially publishable. It follows somehow the IMRaD structure, even if with some drawbacks, that should be improved. The

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English language is good. In my opinion, the manuscript needs major revisions before being accepted for publication, for several reasons listed below.

Mainly, the theoretical background and the proposed method are not well defined. In particular, the definition of the climate index is not well explained in the text (it can be deduced after reading the results), and the procedure for obtaining the maps of changes in threshold exceedance related to infrastructures are not clear.

Moreover, is not explained how the Authors used the information contained in the maps of slope, TRI, geology, soil types, rainfall erosivity, and CLC. These maps were used only for comparison with the obtained results? Or they were used also in the calculations? This should be explained.

In several parts of the manuscript, Authors refer both to “landslides” and “landslide events”. I would suggest to define what a “landslide event” is or to use the simple “landslide”.

If I have well understood, Authors are referring on threshold overcoming as climate index for landslide occurrence. That’s true? If yes, this should be reported and defined clearly in the text.

Moreover, several toponyms and names of regions are reported in the text. A map with all those names (also as supplementary material) would be useful for non-Europeans readers. At least, I suggest adding the names of the Countries in which the cited regions are located (e.g., Alsace, France).

For what concern the structure of the paper, the “Introduction” section is not very easy-to-read. At the beginning there is a summary of the work (lines 3-6), which should be better located and the end of the section.

The “Data” section is good, but another subsection with details about other used data could be appreciated.

The “Method” section is not clear. The definition of the climate index is not effective and

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the procedure used to pass from whole maps to infrastructure maps should be better described. Moreover, the cited work made by Matulla et al. (2017) present a very similar approach and similar results. Thus, differences and improvements proposed in this new paper should be strongly described.

The “Results and Discussion” section is well-structured. However, two subsection could be added, referring to “Central Europe” and “Target area”.

The “Outlook” section should be reworded, presenting the main findings and innovations of the work, and not only the future developments.

The reference list is complete, and all the articles are cited in the text.

SPECIFIC COMMENTS

The abstract should be shortened, particularly in the parts at lines 1-8 and 20-25.

The Central European region should be geographically defined.

Please, for a good understanding, add letters (a, b, ...) in the panels of all figures. Consequently, add information in the captions. As an example, the text reported at page 5, lines 5-6 (The first row of each figure refers to the near future, the second row displays projection results for the remote future. The three columns represent the quartiles in increasing order respectively) should be better written in the caption of Figure 1. The same for the other figures.

Table 1 could be changed in two tables: one referring to values related to roads, and another with values related to railways. In the caption, just mention the CI, without repeating the threshold values. I suggest moving to the method section the text reported at page 8 lines 6-9 and lines 15-20. Figure 6b: I suggest considering only the second level of the CLC classification. Please be sure that all the characters in the figures will be readable.

Please check the text and correct some typos and errors in referencing in the text.

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Finally, I would suggest some works dealing with: i) climate change and infrastructures (Loveridge et al., 2010); ii) landslide hazard and risk hotspots in Europe (Jaedicke et al., 2014); iii) effects of environmental changes on landslide occurrence (Beguería, 2006; Gariano et al., 2017), on susceptibility evaluations (Van Den Eeckhaut et al., 2012; Pisano et al., 2017), and on risk analysis (Papathoma-Köhle and Glade, 2013; Promper et al., 2014).

TECHNICAL CORRECTIONS

Page 2, line 11: note that “IPCC, 2014b” is cited in the text before “IPCC, 2014a”.

Page 2, line 20: add a space in “Europe(Nestroy”.

Page 2, line 26: correct GCMs.

Page 3, line 3: delete comma after “both”.

Page 3, line 4: correct brackets in “key determinants affecting landslides Gariano and Guzzetti (2016); Sidle and Ochiai (2013).”.

Page 3, line 23: insert here the references for the thresholds that define the climate index.

Page 4, line 29: KLIWAS17 is not defined in the text.

Page 5, caption of figure 1: replace “&” with “and”.

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