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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Damage functions for climate-related hazards: unification and uncertainty analysis" *by* B. F. Prahl et al.

Anonymous Referee #2

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General comments

The paper presents a formulation of a unified damage function on intermediate complexity. Based on explicit or implicit treatment of individual items within a given portfolio, a generalized damage function is formulated to describe relative damages to such portfolio. Exemplary case studies are presented including a sensitivity analysis of different uncertainty sources.

The presented framework offers a simple and universal methodology which is, in theory, applicable to a number of scenarios and thus poses a significant step towards a unification of damage functions.

In general however, I find reading the manuscript a bit confusing, which certainly is

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partly due to its structure. In my opinion, readability of the document is affected by dividing the content of the manuscript into main text, appendices and supplementary material. Many details and explanations necessary to understand the fundamental ideas of this paper as well as the discussed example cases are missing when reading the main text.

One weakness of the manuscript in my opinion is the fact, that it does not give evidence to the question, why the formulated damage function can be (a) assumed universal in a practical sense as stated by the authors and (b) why this framework offers further insight compared to the cited approaches for the individual damage modelling approaches. Even though the discussion of different case studies demonstrates the technical applicability of the unified damage function, from reading manuscript the benefits remain unclear and remain somehow speculative.

Specific comments

6850: Lines 11-16: Particularly for severe events, damages might be highly sensitive to macroscopic effects such as crevasse. In the proposed framework, such effects pose immediate effect on a (large) share of the individual hazard thresholds within the portfolio. It should thus be discussed in how far this influences the uncertainties within the proposed methodology.

6855, Lines 24-26.: It should be explained why the authors consider the discussed sources of uncertainties as the major ones. Otherwise this remains an assumption only.

6856, Lines 1-11.: To be able to understand and interpret the results, details on the set up of the case studies are missing (even in the supplementary material). E.g. information and sources of predictor variables and damage data should be specified.

6857, Lines 1-7: It does not become clear, how the Monte Carlo methodology is performed nor how it is linked to the given details in the supplementary material.

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6858: Lines 1-5: Figure 2e not only shows a strong increase in affected buildings at thresholds exceeding 4 m, but also at higher thresholds rather steep increases arise. It should be discussed why these “jumps” do not lead to similar effects on the threshold uncertainty on the macroscopic level.

6858, Lines 11-15: I do not see how the low increase of affected buildings lead to higher impacts of intrinsic uncertainties. Clarification on that should be given possibly including interpretation of this aspect. 6859, Lines 4-5: The authors should explain in how far the conceptual model admits a multi-hazard perspective, since it does not become evident in the text.

6860, Lines 1:3: From the results presented in this study I can follow this conclusion. However how does this finding relate to other studies identifying high sensitivity to hazard strength, particularly in case of the most severe events. I believe this finding relates to the assumption that macroscopic damages are comprised as linear sums of individual damages on the microscopic level, which in case of large portfolio leads to diminishing uncertainties.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 6845, 2015.