Natural Hazards and Earth System Sciences Discussions

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Comment on nhess-2021-237

Anonymous Referee #1

Referee comment on "Effective uncertainty visualization for aftershock forecast maps" by Max Schneider et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-237-RC1, 2021

General comments

This paper addresses the highly relevant topic of support of judgments based on aftershock forecast maps. The authors describe an online experiment with over 880 participants, they compared map reading accuracy and judgment based on three different forecast map types including uncertainty. The choice of the three map types displaying forecast and uncertainty as adjacent maps, as coincident map with uncertainty as transparency, and as "bounds" (best case / worst case) maps makes sense from what we know from the literature. In advance, the authors conducted expert interviews for definition of the task which appropriate. Other positive aspects of the methodology are the pre-registration of the experiment, the determination of effect sizes from a pilot study, and the relatively high payment for the participants.

Results include differences in reading accuracy using the three maps, and participants' improved understanding of possible consequences in the high uncertainty case with the "bounds" representation, an implicit uncertainty visualization technique. The authors present a critical discussion of the results in light of the literature, with a focus on the most interesting judgment task. They give recommendations which map type should be used for which goal (accurate map reading or judgment under uncertainty). The findings are interesting and novel.

The formal quality of the manuscript is excellent, the language is clear and understandable.

Generally, I find this work to be of high quality, presenting new insights and practical implications for uncertainty visualization in the area of risk maps. I recommend its publication after addressing the issues I raise in the next section (minor revision).

Specific comments

The introduction is very good, the related work is well chosen and the separation into the three subsections (1.2, 1.3, and 1.4) makes sense to me. From subsection 1.1 and Figure 1 I understand that existing maps display the expected number of aftershocks per time or the probability of aftershocks. What I do not understand is the claim that the latter map "does not make uncertainty explicit" (l.88). I would say the probability of an aftershock at a location is an explicit measure for the uncertain event of an aftershock? I would like to ask the authors to clarify this point.

With respect to the research questions in 1.5, I stumbled upon the term "lay users". This term does not seem sufficiently precise to me. I guess that the authors wanted to stress

the fact that map reading does not require domain knowledge. But why would you limit the observation to a group without this knowledge? In section 2 they even say that you deliberately chose participants from US states with earthquake events. So this obviously contradicts with the term “lay users”. Please elaborate on this or think about a better term (maybe just “map readers” or “people”?).
What I see as a weakness in the experiment design is that task 3 depends on tasks 1 and 2 (reading accuracy). It should be ensured as a first experiment that all maps can be read with high accuracy. In a second experiment, only the maps fulfilling this criterion should be used for the judgment task. But maybe for this setup this is not a severe flaw. But the authors should add this to the limitations section.
The finding that participants gain a better understanding of possible consequences in the high uncertainty case demonstrates the potential of intrinsic encodings, opposed to extrinsic ones. I suggest to add the terminology of intrinsic / extrinsic to the paper since it makes a difference here.

Technical corrections
I do not see the need for corrections of spelling errors or similar.