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Reply on RC1

Fausto Guzzetti

Author comment on "Invited perspectives: Landslide populations – can they be predicted?"
by Fausto Guzzetti, Nat. Hazards Earth Syst. Sci. Discuss.,
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Response to the comments of the first reviewer

The manuscript "Invited perspectives: Landslide populations - can they be predicted?" provides a very interesting concise review about what approaches and data is available for predicting hazard and risk of populations of landslides. The manuscript is very well structured into the individual questions: where? when or how frequently? how many and how large? Consequences?

From my point of view this is valuable, however, with adding some more information and particularly ideas for perspective and the way forward, this manuscript can become significantly more interesting for the scientific community.

I am pleased that the reviewer has found the manuscript valuable, and I thank the reviewer for the positive comments and the useful recommendations.

Thus, I suggest the following: For each of the tackled questions knowledge gaps are presented. It would be great to put this somehow in order in respect to the urgency they should be closed. Please add some more information on which problems are important to solve (and maybe which are not so important but scientifically interesting). Please add one paragraph on what is the most pressing knowledge gap or challenge in respect to landslide predictions. Elaborate why it is important to solve this problem, if possible link this to practical problems of civil protection.

As I have written in a previous post in response to the comment of this reviewer, the Editors have requested a (very!) short article, which will be part of a special issue celebrating the 20th anniversary of the journal. The limits in length, make it very difficult to respond fully to the request of the reviewer. As requested, I have added a new paragraph in the text.

The new language reads, "Of the various factors governing landslide hazard the most uncertain and the one requiring more urgent efforts is the time prediction (when, how frequently), followed by the prediction of the size and number of expected failures. For both, multi-temporal inventories and landslide catalogues are essential to build innovative predictive models. To construct the records, systematic efforts are needed for landslide detection and mapping (Mondini et al., 2021). For susceptibility (where), the challenge is

to have reliable regional, continental, or global assessments (Stanley and Kirschbaum, 2017; Broeckx et al., 2018; Wilde et al., 2018; Mirus et al., 2020). Critical are also novel modelling frameworks combining the hazard factors (Lombardo et al., 2020). But the goal is to reduce risk (Glade et al., 2005). For that, vulnerability studies, improved early warning capabilities, quantification of the benefits of prevention, and better risk communication strategies are crucial (Guzzetti, 2018)."

Since this is an invited perspective, I suggest to elaborate more about the next steps and the way forward, 1) in respect to what is needed from science, what scientific suggestions do you have, what approaches should be followed, which studies should be undertaken. At the end "convergence research" is mentioned, please elaborate more on how this could look like in respect to landslide prediction, what would be necessary to undertake convergence research of landslide prediction, etc. and 2) what are practical solutions, what can be done by practitioners in respect to landslide prediction, what are practical steps forward.

Considering the mentioned restrictions imposed by the editors on the length of the article, I have done my best to address the issues raised by the reviewer adding language to the last paragraph of the article, which now reads: "Ultimately, I note that in medicine – a field of science conceptually close to the field of landslide hazard assessment and risk mitigation (Guzzetti, 2015) – the paradigm of "convergence research" is emerging (Sharp and Hockfield, 2017), where "convergence comes as a result of the sharing of methods and ideas ... It is the integration of insights and approaches from historically distinct scientific and technological disciplines" (Sharp et al., 2016). The community of landslide scientists should embrace the paradigm of "convergence research", exploiting the vast amount of data, measurements, and observations that are available and will be collected, expanding the making and use of predictions, assessing the economic and social costs of landslides, designing sustainable mitigation and adaptation strategies, and addressing the ethical issues posed by natural hazards (Bohle, 2019). This will contribute to advancing knowledge, and building a safer society (Guzzetti, 2018)."

It would be interesting to know what this all means for practice, e.g. the Italian Civil Protection. How severe is the landslide risk in Italy? What are the main challenges and problems Italian Civil Protection is facing in respect to landslides? How do they approach the landslide risk and what are they planning to do about it in the future? Please add at least one paragraph about these practical aspects.

I have considered this comment thoroughly and, in the end, I have decided not to discuss the issues posed by the reviewers; for two main reasons. First, the paper is meant to be general, and not focused on Italy and on what the Italian Civil Protection does to address landslide risk in Italy. Second, an – even very synthetic – discussion of the topic will require quite a bit of text, which is not available given the format of the paper.