

## Response reviewer 1

Authors: We thank the reviewer for her/his time to read the paper and provide comments. We found the comments and suggestions helpful, and we have revised the paper accordingly. We think that the revised paper is a significant improvement.

Reviewer 1: Terminology: as general assumption of our community (e. g. Merz et al., 2010, de Moel et al., 200), and following what authors write at P2 L43-46, flood impact is one of the three components of flood risk. Therefore, I would avoid to use the statement “flood risk and impact assessment”, because flood impact is somehow included in flood risk. Please, go through the manuscript (include title) and correct these cases.

Authors: Here we intended to make the distinction between flood risk (predictive and probabilistic analysis conducted before an event) from descriptive flood impact assessment (observational and deterministic assessment conducted after an event). We have therefore added clarifying text in the introduction as follows: “We make the distinction between flood risk, as the probabilistic analysis of the *potential* (predictive) impacts of floods and flood impact assessment, as the post-event assessment of (descriptive) impact from an *actual* flood event.”

Reviewer 1: Introduction: I would add some more detailed explanations of the different machine

learning methods. Just some sentences, but it can help in order to have clear in mind, in the rest of the manuscript, what decision trees, neural network, etc. are. In addition, as general comments, I would add some sentences (and references) which state that machine learning methods can really improve estimations, in case of large datasets available: up to now, this concept is taken for granted, but citing some studies that demonstrate it could improve the manuscript, in my opinion.

Authors: Thank you for this comment. We intended to highlight applicability and relevance of ML rather than details of specific methods. However, we have added some additional description of the methods and references, to give the reader a bit more context to the ML methods mentioned, and reference to learn more.

Reviewer 1: Structure: in order to be consistent with the definition of flood risk at P2 L43-49, I would suggest to analyse hazard (current Ch. 3) before exposure (current Ch. 2).

Authors: We agree with the reviewer that the order of the chapters should correspond to the order in which the different components are introduced. We therefore changed the order in which we introduce the different components in the introduction.

Reviewer 1: Ch. 5: I would add, as an issue, the difficulty to use machine learning methods: they require a quite high degree of knowledges in order to really appreciate improvements in flood risk estimation and to avoid errors, that can easily be done by not-experts.

Authors: We would like to thank the reviewer for this suggestion. We think the hype around machine learning can cause misuse and unwarranted trust by users in the models. We added an entire new paragraph to address this issue in chapter 5.

Reviewer 1: P3 L89-90: Why traditional process models were not displaced by machine learning methods? Please explain, or refer to specific following Sections.

Authors: That's an interesting question. This is implicitly already answered throughout the paper when we discuss future changes and obstacles for these changes to occur. However, we also added a sentence about this directly on page 3 so the reader doesn't have to wait for an answer.

Reviewer 1: P11 L352-353: I would suggest to remove the sentence.

Authors: We considered removing this sentence but since this is the only appropriate place to reference to table 2 (see comment below), we decided to keep the sentence.

Reviewer 1: P12 L383-384: please add reference for this statement

Authors: This sentence is a prediction/perspective that is then motivated in the rest of the paragraph. Within this motivation we added a few additional references now that would make this statement more convincing.

Reviewer 1: Table 2 is never cited in the text. Please correct

Authors: We added a reference to this table

Reviewer 1: As suggestion, I list some recent papers I found, which use machine learning methods in the flood risk assessment, and can be useful to cite in order to strengthen some concepts:

Authors: Thank you for these suggestions. These papers can help as references throughout the paper and have been included as additional motivation for existing text.