

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC2  
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## Reply on RC2

Anna Rita Scorzini et al.

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Author comment on "INSYDE-BE: adaptation of the INSYDE model to the Walloon region (Belgium)" by Anna Rita Scorzini et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-363-AC2>, 2022

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We would like to thank the Reviewer for the interest in our work and for carefully reading our manuscript; we greatly appreciate the insightful comments as they may contribute to increase the manuscript robustness and, in general, to improve its quality. In the following, we provide a point by point reply to the general and specific comments raised.

**R2.C1: I suspect a sort of circular argument underlying the sensitivity analysis. The sensitivity analysis investigates changes in the model output (damage estimate) for changes in the different model input variables (using a one at a time approach). Hence, the sensitivity of the model output to these changes depends essentially on the assumptions underlying the model structure and damage functions. Therefore you may not infer general conclusions from that, e.g. like \* an 'overwhelming importance of water depth on the flood damage estimation (p17 l354)' \* '... flow velocity... has been shown to have a negligible influence on the damage estimation' because this only depends on the model assumptions. Please rephrase these paragraphs in a way you have done, for instance, on p20 l 396 and rather derive some useful guidance on which data to put most effort during data collection.**

**ANSWER:** The issue pointed out by the Reviewer is inherent to the nature of a sensitivity analysis, which is specifically aimed at investigating model's response to input data to identify the most important variables within the model. Clearly, the changes in the output depend on the assumptions underlying the model structure, but this is exactly the desired objective of a sensitivity analysis.

Therefore, we would like to stress that the statements reported by the Reviewer are not "general" conclusions, but they refer to the developed model: in revising the manuscript, we will make this point perfectly clear.

**R2.C2: Please check if equation 3 represents what you have analysed within the sensitivity analysis. Did you really consider the difference between positive and negative changes in the different inputs in relation to the reference? How do you obtain positive and negative changes from that as presented in Figures 9 and 10? It would be also good to formulate equation 3 in a way to expresses percentage changes, as it is later reported in Figures 9 and 10.**

**ANSWER:** Equation 3 will be corrected in the revised version of the manuscript. Please

see the responses C2 and C3 to Reviewer 1.

**R2.C3: This entire paragraph merely tells the reader more than that no appropriate data for thorough model validation are available in the target region. Instead, it would be more interesting to present alternative approaches for model validation, e.g. picking up ideas discussed in other papers on model comparison (e.g. Wagenaar 2016, Gerl et al. 2016, or ensemble approaches Figueiredo 2018). You briefly pick up this aspect in the conclusions but I think it deserves more in-depth discussion in section 3.3. As the study does not include proper testing of the adopted model I highly recommend conducting a benchmarking exercise by comparing the outcomes of INSYDE-BE to other damage models in the region.**

**ANSWER:** In the revised version of the manuscript, we will follow the suggestion given by the Reviewer of expanding the discussion and we will then include a benchmarking test for a historical flood event (Ourthe river flood occurred on December 1993-January 1994) by comparing the outcomes provided by INSYDE-BE to those of other damage models in the region (FLEMO-ps, Flemish model and JRC-Belgium).

**R2.C4: (Section 3.1.3): Please indicate the reference year for unit prices in table S1 and indicate a resource for transferring these values to different years, e.g. statistics on building price indices.**

**ANSWER:** The reference year for the unit prices shown in Table S1 is 2020, since we referred to the "Bordereau des Prix Unitaires 2020", as stated at P14.L293 of the original manuscript. For the sake of clarity, we will specify the reference year of the unit prices also in the caption of Table S1, where we will include indication on the possible updating of the prices by considering the construction price index (<https://statbel.fgov.be/en/theme/s/indicators/prices/construction-output-price-index#figures>).

**R2.C5: 4 (Section 4): the statement that the procedure for the adoption of the INSYDE model to the Walloon region is replicable for any other synthetic model (p21 l440) is not supported by the results of this study.**

**ANSWER:** Indeed, in the original manuscript we mentioned that the procedure can be "theoretically" applied also for other synthetic models. To be more clear, in the revised version we will better specify that this could be possible only for those models based on explicit assumptions on input parameters and damage mechanisms, as INSYDE.

**R2.C6: Please find further minor comments and typo corrections in the attached marked-up manuscript).**

**ANSWER:** All the minor comments will be taken into consideration in the revised version of the manuscript. Please see the responses to the individual comments in the attached marked-up manuscript.

**Additional References Wagenaar, D., Bruijn, K. M. de, Bouwer, L. M., and Moel, H. de: Uncertainty in flood damage estimates and its potential effect on investment decisions, 16, 1–14, <https://doi.org/10.5194/nhess-16-1-2016>, 2016.**

The suggested reference will be considered in the revised version of the manuscript.

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2021-363/nhess-2021-363-AC2-supplement.pdf>