Natural Hazards
and Earth System
Sciences

Open Access

EGU

Discussions

Interactive comment on "**INSYDE: a synthetic, probabilistic flood damage model based on explicit cost analysis**" *by* F. Dottori et al.

Anonymous Referee #1

Received and published: 18 June 2016

The paper 'INSYDE: a synthetic , probabilistic flood damage model based on explicit cost analysis' proposes a methodology to derive synthetic damage functions for direct damage to residential buildings. The procedure uses a component wise evaluation of physical damage to residential buildings based on expert knowledge about damage mechanisms and technical papers. A probabilistic element is included to account for intrinsic variability of damaging factors. For the application case, the damage functions are calibrated using a dataset of 60 observed damage cases during the flood in the Umbria region (Central Italy) in November 2012. INSYDE is validated using data available from the 2010 flood in the Caldogno in Veneto region (North-East) Italy. The validation set comprises 300 loss cases of affected buildings and is based on damage quantification forms used to claim loss compensation from the State. Loss estimation results are compared to six flood damage models available from the scientific literature.

Finally, a sensitivity analysis of hazard variables is presented.

The methodology strives to overcome the opacity in synthetic flood loss models and introduces a probabilistic approach to account for uncertainty in damage influencing factors. The paper therefore is a valuable contribution to the field and has merit for publication in NHESS.

However, before publication a number of points need to be addressed from which the major ones are the following. Additional minor comments can be found in the annotated pdf.

1. The structure of the paper is not convenient. This relates in particular to section 3.3 Critical analysis of the model. Many information which are important for the reader are only given at this point as for instance the information base used to derive the INSYDE model (Table 5) which should be given already in section 2 Methodology. Otherwise the information basis used to derive the relationships in Table 1 as well as for the default values in Tables 2 and 3 and the mathematical functions for each damage component remain obscure. Further, a number of future steps are mentioned in this section which could be better included in section 4 Conclusions/Outlook. A critical evaluation of the effort to collect the detailed information required to apply the model is missing and should be described.

2. The probabilistic element of the INSYDE model is presented as a significant and important extension in flood loss modelling. However, the value of this feature in terms of additional information as well as loss model performance is not analysed and illustrated. In the presentation of the model validation it is not clear if INSYDE has been applied in a probabilistic mode and if so, how the probabilistic output of the model has been evaluated. Further, the probabilistic approach is implemented only for selected variables. The selection of these variables and the reasoning for defining the variation range for these variables needs to be explained and justified more in detail. The sensitivity of these uncertainty sources i.e. how it propagates through the model and effects

loss estimates should be analysed. The conclusion drawn concerning the importance to address uncertainty is not supported by the results presented.

3. The INSYDE model is an expert-based approach and as such it is claimed to offer several benefits in contrast to data-based models as for instance the spatial transferability. The set-up of the INSYDE model applied in this study however includes also empirical data from the 2012 flood in the Umbria region. It is then compared to a selection of alternative models. Have these other models also been calibrated with the same data? For the assessment of the INSYDE model performance it would be important to also compare a purely expert-based version of the INSYDE model.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2016-163/nhess-2016-163-RC1-supplement.pdf

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2016-163, 2016.