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MODELING FLOOD DAMAGE TO RESIDENTIAL BUILDINGS AND CONTENTS WITH EXPLICIT UNCERTAINTY QUANTIFICATION FOR MORE INFORMED DECISION-MAKING

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ABSTRACT

Detailed data on hazard, vulnerability and exposure are essential for implementing reliable flood damage models, which are key to support risk management decisions. Despite this importance, issues on data availability, accessibility and completeness may significantly induce large damage estimation uncertainty. This study builds on INSYDE (Dottori et al., 2016), a physically based multi-variable flood damage model for buildings, proposing an updated version (INSYDE 2.0) with an enhanced probabilistic treatment of missing input data and the inclusion of a new module for building contents (INSYDE-CONTENT). Although both models have been specifically conceived and validated for the Po River District, the framework can be successfully applied in other areas after a proper adaptation (Scorzini et al., 2022). In consideration of the high number of required input data, the model has a built-in function that replaces possible missing data with values sampled from probability distributions representative of the hazard and building features in the examined area. These distributions are derived from official data, numerical simulations and virtual surveys of houses listed in real estate websites for the region of interest.
The advantage of this option relies on informative outputs characterized by uncertainty bands, allowing a more informed decision-making compared to a single number resulting from deterministic models, which can sometimes convey a false perception of certainty.

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