

Dealing with imperfect knowledge in natural hazard assessments: beyond classical probabilities and challenges.

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The distinction between two origins of uncertainty has become standard practice in risk analysis, namely random uncertainty (representing variability) and epistemic uncertainty (related to imperfect knowledge). While the former can be adequately represented using classical probabilities, there is no simple, single answer for the latter. New theories of uncertainty based on "imprecise probabilities" have been developed in recent years to go beyond the systematic use of a single probabilistic law. In this tutorial we analyse the advantages and disadvantages for the assessment of natural hazards (e.g. earthquakes, marine floods, landslides, etc.) with a comparison to the traditional probabilistic approach. We discuss the problems that have been solved and the interesting open questions and challenges that remain, in particular how to appropriately support decision making under uncertainty, how to provide guidance for future actions and how to deal with multiple forms of uncertainty along the assessment chain.