How can sensitivity analysis improve the robustness of natural hazard models utilized by the re/insurance industry?

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Insurance companies provide insurance against a wide range of natural hazards. They regularly use mathematical models to quantify risk and support decision-making, for example to set the premiums charged to clients. While these models are essential tools for assessing the risk attached to an insurer's portfolio, their development is costly and their value for decision-making may be limited by an incomplete representation of the uncertainties involved, and their potential impacts on model output. Aside from the obvious business need to understand risk and uncertainty for robust decision making, the insurance sector must also comply with regulations that demand a degree of model testing. However, there is no specific regulatory guideline on the methods to use for such model testing, or for sensitivity analysis, and there is no well-defined and generally accepted approach so far. Moreover, there is a lack of user-friendly tools, specifically tailored to the needs of practitioners and decision makers, to visualise and communicate uncertainty in model-informed decisions. We aim to lead the way in filling this gap by using an established global sensitivity analysis toolbox (SAFE) to more efficiently capture the uncertainties and sensitivities embedded in models used by a leading re/insurance firm. We propose a structured approach to validate these models and test the impact of assumptions and uncertainties on the model predictions. We believe that this effort will ultimately lead to better-informed and more robust business decisions.