



Probabilistic modeling of financial exposure to flood in France

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CCR is a French reinsurance company which offers natural catastrophe covers with the State guarantee. Within this framework, CCR develops its own models to assess its financial exposure to floods, droughts, earthquakes and other perils, and thus the exposure of insurers and the French State. A probabilistic flood model has been developed in order to estimate the financial exposure of the Nat Cat insurance market to flood events, depending on their annual occurrence probability.

This presentation is organized in two parts.

The first part is dedicated to the development of a flood hazard and damage model (ARTEMIS). The model calibration and validation on historical events are then described.

In the second part, the coupling of ARTEMIS with two generators of probabilistic events is achieved: a stochastic flow generator and a stochastic spatialized precipitation generator, adapted from the SAMPO model developed by IRSTEA. The analysis of the complementary nature of these two generators is proposed: the first one allows generating floods on the French hydrological station network; the second allows simulating surface water runoff and Small River floods, even on ungauged rivers.

Thus, the simulation of thousands of non-occured, but possible events allows us to provide for the first time an estimate of the financial exposure to flooding in France at different scales (commune, department, country) and from different points of view (hazard, vulnerability and damages).