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Probabilistic, meso-scale flood loss modelling

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Flood risk analyses are an important basis for decisions on flood risk management and adaptation. However, such analyses are associated with significant uncertainty, even more if changes in risk due to global change are expected. Although uncertainty analysis and probabilistic approaches have received increased attention during the last years, they are still not standard practice for flood risk assessments and even more for flood loss modelling. State of the art in flood loss modelling is still the use of simple, deterministic approaches like stage-damage functions.
Novel probabilistic, multi-variate flood loss models have been developed and validated on the micro-scale using a data-mining approach, namely bagging decision trees (Merz et al. 2013). In this presentation we demonstrate and evaluate the upscaling of the approach to the meso-scale, namely on the basis of land-use units. The model is applied in 19 municipalities which were affected during the 2002 flood by the River Mulde in Saxony, Germany (Botto et al. submitted). The application of bagging decision tree based loss models provide a probability distribution of estimated loss per municipality. Validation is undertaken on the one hand via a comparison with eight deterministic loss models including stage-damage functions as well as multi-variate models. On the other hand the results are compared with official loss data provided by the Saxon Relief Bank (SAB).
The results show, that uncertainties of loss estimation remain high. Thus, the significant advantage of this probabilistic flood loss estimation approach is that it inherently provides quantitative information about the uncertainty of the prediction.

References:
Merz, B.; Kreibich, H.; Lall, U. (2013): Multi-variate flood damage assessment: a tree-based data-mining approach. NHESS, 13(1), 53-64.

Botto A, Kreibich H, Merz B, Schröter K (submitted) Probabilistic, multi-variable flood loss modelling on the meso-scale with BT-FLEMO. Risk Analysis.