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Validation of flood loss models

A.H. Thieken (1), A. Olschewski (1), B. Merz (1), S. Kobsch (2) and H. Kreibich (1)

(1) GeoForschungsZentrum Potsdam, Section Engineering Hydrology, Potsdam, Germany, (2) PGS Planungsgesellschaft Scholz + Lewis mbH, Dresden, Germany (thieken@gfz-potsdam.de / Fax: +49 331-2881570 / Tel: +49 331-2881513)

Flood loss modelling is an essential component for risk-oriented flood design, risk mapping, financial appraisals in the reinsurance sector and comparative risk analyses. However, flood loss models are scarcely validated. Therefore, the reliability of flood loss and risk estimates is fairly unknown.

The scarcity of validation might be due to limited or missing data about (extreme) flood events. Especially, loss data are rarely gathered, (initial) repair cost estimates are uncertain and data are not updated systematically. Therefore, common first order validation methods that compare estimates with observations can seldom be applied. In this case, it is necessary to perform a second or third order validation. This includes the use of expert knowledge, comparison of alternative models, methods for evaluating the process of model construction as well as uncertainty and sensitivity analysis to identify important inputs and processes.

In this paper, it is discussed how validation strategies from other fields can be used for the validation of loss models. Moreover, validations of first and second order are shown for the Flood Loss Estimation MOdel FLEMO.

The model FLEMO estimates direct economic flood losses in the residential sector in dependence of water level, building type and building quality. In an additional model stage, the effects of private precautionary measures as well as of the contamination of the floodwater can also be considered. Loss functions are based on empirical data gathered in 1697 private households in Germany that were affected by a severe flood in August 2002. The model can be applied on the micro-scale, i.e. on the basis of single buildings, as well as on the meso-scale, i.e. on the basis of land use units. For the latter, a scaling procedure based on census data and a dasymetric mapping technique

was developed. This enables a countrywide application of the model in Germany.

The validation of the model is performed on different levels: First, the model structure is compared to other loss models, e.g. stage-damage-functions. Second, different data sets of repair costs at single buildings as well as of whole municipalities are used to validate loss estimates on the micro- as well as on the meso-scale. Loss estimates of FLEMO are also compared to estimates of other models. Further, the transferibility of the model is investigated by means of data from recent floods in 2005 and 2006. First results show that the model FLEMO outperforms simple stage-damage-functions.