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FLEMOcs – a novel, multi-factorial model for the estimation of flood losses in the commercial sector

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The estimation of flood damage is an important component for risk-oriented flood design, risk mapping, financial appraisals and comparative risk analyses. However, research on flood-loss modelling, especially in the commercial sector, has not gained much attention so far. The estimation of flood loss is a challenge, especially in the commercial sector, because of its great inhomogeneity. However, the reliability of loss modelling is fairly unknown, since flood-loss models are scarcely validated.
Extensive data about flood losses were collected for affected companies via telephone surveys after the floods of 2002, 2005 and 2006 in Germany. Potential loss determining factors were analysed. The new Flood Loss Estimation MOdel for the commercial sector (FLEMOcs) was developed on the basis of 642 loss cases. Losses are estimated depending on water depth, sector and company size as well as precaution and contamination. The model can be applied to the micro-scale, i.e. to single production sites as well as to the meso-scale, i.e. land-use units, thus enabling its countrywide application.
FLEMOcs was validated on the micro-scale using a leave-one-out cross-validation procedure. Meso-scale model application was undertaken in 19 municipalities which were affected during the 2002 flood in Germany. Model results were compared with the results of three other loss models, as well as with official loss records. The micro-scale validation shows very good results, with no bias and mean absolute errors between 23 and 31%. The meso-scale validation indicates that FLEMOcs provides good results, especially in large areas with many affected companies where high losses are expected.