

Seismic Risk Modelling: Do Insurances and the Scientific Community talk about the same?

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Abstract

The evaluation of seismic risk is one of the major issues in insurance and reinsurance industry. Therefore, MunichRe started risk modelling in 1987, at a time when seismic risk models existed only for site specific studies. To date MunichRe uses proprietary earthquake models for 26 different countries.

During the last about 10 years numerous probabilistic earthquake risk models were developed by scientific working groups world wide. But the insurance industry uses these models to a very limited extent, if at all. Most companies prefer to develop their own models or to license models of consultancies, which are specially designed for insurance purposes. This also holds for MunichRe. What are the reasons?

One of the main causes is, that most existing models are hard to adapt to the special requirements of insurance business. Besides the modules for hazard and vulnerability, which are a standard for all models, further insurance related modules for data input, finances and data output are necessary. Many models are based on a defined and fixed building stock, mainly characterized by location (i.e. address or coordinates), building type and an estimated value for each single building or building type. There is usually a heavy focus on buildings and on structural losses whereas actual loss patterns demonstrate the important role played by non-structural and contents losses, and sometimes by business interruption. Furthermore, the insurance industry uses standardised data formats for the exchange of portfolio information, which are used as input data for modelling. Insured values, defined by terms of contract, are given for defined lines of business and are aggregated for CRESTA zones, i.e. administrative units.

Risk models differ much in their purposes, applications, secondary effects considered, resolution and vulnerability functions, which makes a comparison of models very difficult. Additionally, the use of terms like damage grade, structural loss or economic loss for example varies and creates confusion.

Since case studies, where losses of damaging earthquakes are compared with modelled scenario losses are very sparse, a qualitative evaluation of earthquake risk models is hard to achieve. Sometimes it gives the impression that the reliability of a model is defined rather by the number of modelling parameters or a very high modelling resolution than by the plausibility of the final result.

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