



Time-varying loss forecast for an earthquake scenario in Basel, Switzerland

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When an unexpected earthquake occurs, people suddenly want advice on how to cope with the situation. The 2009 L'Aquila quake highlighted the significance of public communication and pushed the usage of scientific methods to drive alternative risk mitigation strategies. For instance, *van Stiphout et al. (2010)* suggested a new approach for objective evacuation decisions on short-term: probabilistic risk forecasting combined with cost-benefit analysis. In the present work, we apply this approach to an earthquake sequence that simulated a repeat of the 1356 Basel earthquake, one of the most damaging events in Central Europe. A recent development to benefit society in case of an earthquake are probabilistic forecasts of the aftershock occurrence. But seismic risk delivers a more direct expression of the socio-economic impact. To forecast the seismic risk on short-term, we translate aftershock probabilities to time-varying seismic hazard and combine this with time-invariant loss estimation. Compared with *van Stiphout et al. (2010)*, we use an advanced aftershock forecasting model and detailed settlement data to allow us spatial forecasts and settlement-specific decision-making. We quantify the risk forecast probabilistically in terms of human loss. For instance one minute after the M6.6 mainshock, the probability for an individual to die within the next 24 hours is 41 000 times higher than the long-term average; but the absolute value remains at minor 0.04 %. The final cost-benefit analysis adds value beyond a pure statistical approach: it provides objective statements that may justify evacuations. To deliver supportive information in a simple form, we propose a warning approach in terms of alarm levels. Our results do not justify evacuations prior to the M6.6 mainshock, but in certain districts afterwards. The ability to forecast the short-term seismic risk at any time—and with sufficient data anywhere—is the first step of personal decision-making and raising risk awareness among the public.

Reference

Van Stiphout, T., S. Wiemer, and W. Marzocchi (2010). "Are short-term evacuations warranted? Case of the 2009 L'Aquila earthquake". In: *Geophysical Research Letters* 37.6, pp. 1–5. url: <http://onlinelibrary.wiley.com/doi/10.1029/2009GL042352/abstract>.