Geophysical Research Abstracts, Vol. 7, 08890, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08890

Dynamic seismic hazard model for New Zealand

T. Tormann (1), M.K. Savage (1), M.W. Stirling (2)

(1) Victoria University of Wellington, New Zealand , (2) Institute of Geological and Nuclear Sciences, Lower Hutt, New Zealand, Contact: thessa@tormann.de

We have created a new dynamic seismic hazard model for New Zealand to add the effects of short-term hazard fluctuations due to earthquake triggering to the current Poissonian probability from the national probabilistic seismic hazard model. Prospective foreshock probability decay is modelled as a function of origin time and epicentral distance from the potential foreshock, and the magnitude difference between foreshock-mainshock pairs. Across the country, the probability distribution follows the Gutenberg-Richter relationship with a b-value of 1.3. In the Taupo Volcanic Zone (TVZ), a region characterised by crustal extension and volcanism, the foreshock probability decreases with approximately $1/t^{2.4\pm0.5}$ and $1/r^{3.62\pm0.03}$. Elsewhere in the country, the decay with time and distance is smaller, at $1/t^{1.6\pm0.2}$ and $1/r^{2.7\pm0.2}$. This is consistent with the higher attenuation of seismic energy likely to be experienced in an area of active volcanism. Combining this information with a generic aftershock model, we calculate fluctuating daily hazard maps for New Zealand, showing the regional probability distribution for peak ground accelerations of 0.05g or more being observed.

We have also developed a methodology to test these ground motion forecasts against 40 years of strong motion observations in New Zealand. The Poissonian model underestimates the hazard for the time period and locations in the dataset by a factor of two. The new dynamic seismic hazard model provides a closer match to the strong motion records, but with some overestimation of hazard on days of high probability and underestimation on days of low probability forecasts.