Geophysical Research Abstracts
Vol. 12, EGU2010-13324, 2010
EGU General Assembly 2010

Towards more realistic source modelling for strong ground motion simulations

Katrin Kieling, Rongjiang Wang, and Sebastian Hainzl
GFZ German Research Centre For Geosciences, Potsdam (katrin.kieling@gfz-potsdam.de)

The modelling of ground motions related to earthquakes is of major importance for seismic hazard analyses. Especially the variability of ground motion close to the source influences the uncertainties of seismic hazard estimates. Because realistic full-dynamic rupture simulations are computational expensive and hence inefficient, we aim at implementing more realistic sources in kinematic ground-motion modelling.

For the modelling of extended earthquake sources, there are different approaches. Their common aim is to give approximately correct values of interest for engineering seismologists such as peak ground acceleration (PGA) or duration. We choose a composite approach where the source process is represented by a high number of small subevents which are distributed randomly on the fault. Each subevent is characterised by its own source time function. Those are superposed for each fault patch and convolved with the patches Green's function.

We test the influence of different model parameters on the resulting ground motion close to the source. For example, random variation of focal parameters such as strike, dip and rake are introduced to smear out the radiation pattern. The influence of rupture velocity and the discretisation step of the fault are tested. Furthermore different random slip distributions are used to show the variability of ground motion due to the used slip model.

Finally we compare the the modelled waveforms to the observed waveforms of the Tokachi-Oki earthquake (M=8.3), which occurred on September 25, 2003 offshore Hokkaido, Japan. For this earthquake a great number of strong motion records allows the comparison of high-frequency acceleration waveforms. Additionally, 1-Hz GPS displacement waveforms are available and may be compared to our modelling results.