Geophysical Research Abstracts, Vol. 9, 07468, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07468

Dynamic inversion of the 2000 Tottori earthquake based on elliptical subfault approximations

S. Di Carli, **R. Madariaga**, C. Holden

Laboratoire de Géologie, Ecole Normale Supérieure, Paris, France (sdicarli@geologie.ens.fr)

We develop a fast and efficient dynamic rupture inversion method based on elliptical subfault approximations. Since an elliptical patch has only 7 independent degrees of freedom (position, angle, axes and stress level), we are able to reduce the number of parameters for the inversion. We study the 2000 Tottori (Japan) earthquake that is the first important event recorded by the kik-net network and that provides a unique set of near-field data. For this earthquake, a large number of kinematic studies succeded in reproducing observed seismograms. However, such kinematic inversions are not based on mechanical considerations about fracture mechanism. To distinguish among these kinematic models, we develop a dynamic rupture inversion method: we use the slip-weakening friction law with the same parameters for all locations and for all times. We then inverted from an initial stress distribution controlled by few elliptical patches (*M. Vallée and M. Bouchon* 2004).We implement this method of trial and error with a direct non linear dynamic inversion technique using the Neighbourhood algorithm (*NA, Sambridge,* 1999; 2001),minimizing the misfit between computed and observed seismograms.We tested different dynamic models similar to the one obtained by kinematic inversion from *Holden et al.* 2007. We used absolute time of the records and we relocated the hypocentre close to 14km in depth. We apply the inversion to a set of 33 strong motion recordings located within 40km of the epicentre. The data are processed using a band pass center Butterworth filter from 0.1 to 0.5 Hz and integrated to velocity. For the inversion we used 2 elliptical patches. The fit between observed data and synthetics is measured with an L^2 norm. Our model is characterized by slow rupture from hypocenter to the second patch situated near 7km in depth. Then rupture explodes laterally and finally stops generating a large stopping phase that dominates the records. Stress drop, of about 40 Mpa, is very large inside the second patch. This value can be linked to also high value of the fracture energy, about 45 MJ/m^2.