Geophysical Research Abstracts, Vol. 7, 05358, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05358

Nonlinear kinematic inversion of the october 2000 Tottori, Japan earthquake

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A nonlinear kinematic inversion method is applied to the $Mw = 6.8$, October 2000, Tottori (Japan) earthquake. The earthquake region was well instrumented and provided a good strong motion data set that has been intensively studied. The algorithm used for our inversion is the Neighbourhood Algorithm. The method is applied to a set of 15 strong motion recordings located within 30 km of the epicenter. The fit between observed data and synthetics is mesured with an L^2 norm. To reduce computing times, the final steps in the inversion, once the solution has converged to a well defined minimum, are completed with a downhill simplex algorithm.

The first purpose of this study is to validate the inversion method by comparing our results with those from linearised kinematic inversions by Yagi (2001) and Semanne et al. (2005). Our nonlinear inversion is performed using the same initial parameters such as the velocity model, the rupture velocity, the fault size, the location of the hypocenter and the data filtering. The data have been filtered using a forward fourth-order Butterworth bandpass filter in the frequency range of 0.05-0.5 Hz. The fault is parameterized with a model containing initially 60 patches of size $3 \times 5\ km$. The number of subfaults will then be decreased progressively to determine the minimum number of parameter that needs to be resolved.

Secondly, in order to satisfy the dynamic aspects of the rupture, the method will be applied to the same set of data with different initial parameters. The major changes will involve varying the hypocentral location that was badly constrained for that event, fixing the absolute timing of the data, and applying rigourous filters. Results will then be compared to the dynamic inversion results obtained by Peyrat et Olsen (2004).