Geophysical Research Abstracts, Vol. 7, 03634, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03634
© European Geosciences Union 2005

Fault slip distribution of two June 2000 Mw 6.5 earthquake in South Iceland estimated by strong motion inversion.

D. Sandron (1), P. Suhadolc(1), S. Das(2), G. Costa(1)

(1) Dipartimento di Scienze della Terra, Università degli Studi di Trieste, Italy, (2) Department of Earth Sciences, University of Oxford, U.K.

We study the two Mw 6.5 earthquakes occurred in the Southern Iceland Seismic Zone on June 17 and 21, 2000 by inverting strong motion records.The two events occurred on two parallel N-S striking, right-lateral strike-slip faults, separated by about 17 km. The fault mechanism and the fault area are taken as known parameters in the inversion and are deduced from teleseismic centroid moment solutions and from aftershock distribution, respectively. The used fault model for both events is a two 20 km long and near-vertical fault extending from the surface to approximately 15 km depth. To solve the inverse problem, we use the method of linear programming and we stabilize the solution by using physical constraints.

In order to determine how reliably we can invert accelerograms to determine the slip on the fault, we first perform the inversion using artificial data, the vertical component of synthetic accelerograms for a Haskell-type earthquake rupture model, keeping the same geometry of the fault and actual station distribution. The inversions are performed for different grid sizes and different nucleation points, and we analyze the effect of the rupture propagation velocity on the result of the inversions. The constraints of the positivity of the slip rates on the fault is used in all cases in this study. In some cases additional physical constraints, such us preassigning the final moment, is also used.

Then, we invert observed records acquired by a local strong-motion network. We use only data from a set of rock-stations distributed uniformly around the fault. The accelerograms are filtered at 1Hz and we model about 15 sec of the signals. The obtained waveform fit is fairly good. Our preliminary results suggest a relatively uniform distri-

bution of moment over the fault, with the maximum energy release near the hypocentre.

References:

1. Das, S. and Kostrov B. V. Inversion for seismic slip rate and distribution with stabilizing constraints: Application to the 1986 Andreanof Islands earthquake. J. Geophys. Res., 95, 6899-6913,1990

2. Das, S., and Kostrov B. V. Diversity of solutions of the problem of earthquake faulting inversion. Application to SH waves for the great 1989 Macquarie Ridge earthquake. Phys. Earth Planet. Inter., 85,293-318,1994

3. Das, S., Suhadolc P. and Kostrov B. V. Realistic inversions to obtain gross properties of the earthquake faulting process, Tectonophysics. In C. Trifu (ed.), Special issue entitle Seismic Source Parameters: from Microearthquakes to Large Events 261, 165-177,1996

4. Das, S. and Suhadolc P. On the Inverse problem for earhquake rupture. The Haskell-type source model. J. Geophys. Res., 101, 5725-5738,1996