Geophysical Research Abstracts, Vol. 8, 07839, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07839

Seismic hazard in Istanbul, Turkey, based on ground motion simulations, and uncertainties in the predicted ground motion levels

M.B. Sørensen (1), N. Pulido (2) and K. Atakan (1)

(1) Department of Earth Science, University of Bergen, Norway, (2) National Research Institute for Earth Science and Disaster Prevention (NIED, EDM), Kobe, Japan

Following the disastrous earthquakes in Izmit and Düzce along the North Anatolian Fault in 1999, the earthquake hazard in the Istanbul area became a great concern. In this study we simulate strong-ground motions caused by a M=7.5 earthquake in the Marmara Sea with special emphasis on the effect of varying the input parameters. Simulations are based on an earthquake scenario in the Marmara Sea using a multi-asperity source model that involves the combined rupture of the North Anatolian fault segments beneath the Marmara Sea. In the simulation of the strong ground motion, we use a hybrid model combining a deterministic simulation of the low frequencies (0.1-1.0 Hz) with a semi-stochastic simulation of the high frequencies (1.0-10.0 Hz) using empirical Green's functions. We apply a high-frequency radiation model which uses a smooth transition between non-spherical to spherical wave radiation as the frequency increases. Computation at each frequency range is performed separately and the total ground motion is combined in the time domain. We calculated a total of 17 earthquake scenarios corresponding to different hypocenter locations and source parameters on a regular grid, and obtained information on the sensitivity of ground motion to these parameters. The most significant parameters in terms of ground shaking level are rise time, rupture velocity, rupture initiation point and stress drop. However these parameters affect different frequency bands, and the spectral ground motions at a number of sites show that the parameters of main engineering interest are the rupture initiation point and the stress drop