

Application and verification of the 'Recipe' to the strong-motion evaluation for the 2005 west off Fukuoka earthquake

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The strong-motion evaluations for ten active faults have been done by Headquarters of Earthquake Research Promotion (HERP). These evaluations were done following a methodology of strong motion prediction (Recipe) summarized by HERP. Here we simulate strong ground motions by applying the 'Recipe' for the west off Fukuoka earthquake on March 20, 2005.

We constructed four characterized source models. Three of them were based on the results of source inversion analyses using strong-motion records. Another one was set following the 'Recipe'. We also constructed a deep underground structure model from seismic bedrock to engineering bedrock (V_s 600m/s) for the northern Kyushu region. First, we constructed an initial model by geological supplementations referring to collected geophysical surveys, borehole data and so on. Then we improved the initial model to be matching the peak period of theoretical H/V spectrum of the fundamental mode of Rayleigh wave to the H/V spectrum obtained from observed records. Waveforms on the engineering bedrock were calculated by using the hybrid method. This is a combination of a 3-D finite difference method for long-period waves, and a stochastic Green's function method for short-period waves. The peak ground velocities and seismic intensities on the ground were obtained by using empirical relations from the waveforms on the engineering bedrock.

As an overall feature, peak ground velocity and seismic intensity distributions match well to observed ones. Calculated waveforms are well reproduced observed one at stiff soil sites. However, waveforms in and around basin sites do not match enough to observed ones. This implies that we should improve a deep underground structure model furthermore. We also should evaluate the effects of shallow ground structure.

We also investigated effects of the difference in the rupture velocity on simulated waveforms. As a result, we found that the peak value of ground motion was very sensitive to the rupture velocity change.