

National seismic hazard maps for Japan and seismic hazard information station, J-SHIS

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The Headquarters for Earthquake Research Promotion of Japan published the National Seismic Hazard Maps for Japan in July 2009, which was initialized by the earthquake research committee of Japan (ERCJ) on a basis of long-term evaluation of seismic activity, and on a basis of strong-motion evaluation. The hazard maps consist of two kinds of maps. One is a probabilistic seismic hazard map (PSHM) that shows the relation between seismic intensity value and its probability of exceedance within a certain time period. The other one is a scenario earthquake shaking map (SESM).

The examples of PSHMs are maps of probabilities that seismic intensity exceeds the JMA scale 5-, 5+, 6- and 6+ in 30 or 50 years, and maps of the JMA seismic intensity corresponding to the exceedance probability of 3% and 6% in 30 years and of 2%, 5%, 10% and 39% in 50 years. We classify earthquakes in and around Japan into three categories such as the characteristic subduction zone earthquakes, subduction zone earthquakes, and crustal earthquakes. PSHMs for three earthquake category are also evaluated. For the PSHM, we used empirical attenuation formula for strong-motion, which was followed the seismic activity modeling in the basis of long-term evaluation of seismic activity by ERCJ. Both of peak velocities on the engineering bedrock and on ground surface are evaluated for sites with approximately 0.25km spacing in the basis of the 7.5-Arc-Second Engineering Geomorphologic Classification Database. The JMA seismic intensities on ground surface are evaluated by using an empirical formula.

The SESMs are evaluated for 490 scenario earthquakes of all major faults in Japan. For the SESMs, based on the source modeling for strong-motion evaluation we adopt a hybrid method to simulate waveforms on the engineering bedrock and peak ground velocity. The hybrid method aims to evaluate strong-motions in a broadband frequency range and is a combination of a deterministic approach using numerical simulation methods, such as the finite difference method, for low frequency range and a stochastic approach using the empirical or stochastic Green's function method for high frequency range. A lot of parameters on source characterization and modeling of underground structure are required for the hybrid method. The standardization of the setting parameters for the hybrid method is studied. We summarized the technical details on the hybrid method based on the 'Recipe for strong-motion evaluation', which are published by the ERCJ.

The National Seismic Hazard Maps for Japan are a comprehensive integration from all of the research aspects conducted by ERCJ. It contains information of all necessary data for producing the maps. We have developed an open web system to provide seismic hazard information interactively, and named this system as Japan Seismic Hazard Information Station, J-SHIS (<http://www.j-shis.bosai.go.jp/>). We aim to distribute a process of uncertainty evaluation and to meet multi-purpose needs in engineering fields. The information provided from J-SHIS includes not only results of the hazard maps but also various information required in the processes of making the hazard maps, such as data on seismic activity, source models and underground structure.