Study on Probabilistic Seismic Hazard Maps for Northern Part of Japan

Toshihiko Okumura[1], Hiroyuki Fujiwara[1], Toru Ishii[1], Yuzuru Hayakawa[1], Shinichi Kawai[1], Shin Aoi[1], Yutaka Ishikawa[2], Jun'ichi Miyakoshi[2], Tomoo Saito[2], Hideaki Shinohara[3]

[1] NIED, [2] Shimizu Corp., [3] OYO

A method is studied and developed to make probabilistic seismic hazard maps for northern part of Japan. The earthquakes in and around the mapping area are categorized into eight different groups depending on the location, size, type, and available information on the earthquakes. Examples include the characteristic earthquakes along the major active fault zones, large earthquakes in the subduction zone, background earthquakes in the subduction zone, and background earthquakes in the upper crust. The probability model of earthquake occurrence is constructed for each earthquake group. The long-term evaluation of earthquakes presented by the Headquarters for Earthquake Research Promotion and the results of the recent researches are reflected to the model. The attenuation relation is modified so that it represents the regional attenuation characteristics in the area of interest. Also the surface layer amplification is evaluated and taken into account at each site. The seismic hazard curves are then evaluated in terms of peak ground velocity at the sites with approximately 1 km spacing in the entire area of Hokkaido and Tohoku region. Finally, the seismic hazard maps are created based on these seismic hazard curves. The distinctive features of the method can be summarized as follows: 1) detail earthquake categorization; 2) reflection of the newest information on earthquake occurrence; 3) modeling occurrence linkage for some earthquakes; 4) consideration of regional attenuation characteristics; and 5) evaluation of seismic hazard at 1km spacing with the effect of surface layer.