日本列島の地震災害確率マップ

Probabilistic Seismic Hazard Maps for Japanese Islands

アンドレゼチ キシコ [1], # Ali Osman Oncel [2]
Andrzej Kijko [1], # Ali Osman Oncel [2]

[1] 南ア地調, [2] 地調
[1] GSSA, [2] Geophysics Dept. GSJ

新しい手法による日本列島の地震災害確率(PSH: Probabilistic Seismic Hazard)マップを作成した．この方法はパラメトリック－ヒストリック法と呼ばれる方法に基づいている．ここでは，演繹的手法と，宇津(1982),宇佐美(1996)および JMA の歴史地震記録を使用した．日本列島を 0.05度のグリッドに分割し，そこでの最大加速度振幅をもとに，1, 3, 5, 10 Hz に対する加速度応答スペクトルを予測し，50年間の災害確率を10パーセントのコンターで表した.

Probabilistic Seismic Hazard (PSH) maps are conducted by utilizing a new methodology for PSH that is called Parametric-Historic (PH) method since it combines the best features of the "deductive" (Cornell, 1968) and "historic" (Veneziano et al., 1984) procedures.

PH technique has been developed specifically for the estimation of seismic hazard at individual sites without the subjective judgment involved in the definition of seismic source zones, when specific active faults have not been mapped and identified, and when the causes of seismicity are not well understood. PH permits the combination of historical and instrumental data. The historical part of the catalogue contains only the strongest events, whereas the complete part can be divided into several subcatalogues, each assumed complete above a specified threshold of magnitude. Uncertainty in the determination of magnitude has also been taken into account. The maximum credible magnitude mmax is of paramount importance in this approach.

The seismic hazard maps are based on the compiled of a long-term earthquake history (599-1997) using the catalogs of Utsu's (1982), Usami's (1996) and JMA for the Japanese Islands. The analysis is based on the subdivision of the Japan into subregions at a grid size of 0.05 degree, for each of which peak ground accelerations, and uniform hazard acceleration response spectra for natural frequencies of 1, 3, 5 and 10 Hz are predicted and mapped to occur at 10 % probability in 50 years.

Acknowledgements

We are grateful to Dr.Kunhiko Shimazaki, Dr. Stefan Wiemer and Dr.Xinglin Lei for making the earthquake catalogue available. A.O. Oncel acknowledges the support of AIST fellow during his stay at the Geological Survey of Japan as a visiting scientist.

References

Cornell, C.A., Engineering seismic risk analysis. Bull. Seism. Soc. Am, 1968, 58, 1583-1606.

Usami, T. (1996). Materials for Comprehensive List of Destructive Earthquakes in Japan, 416-1995, Univ. Tokyo Press, Tokyo.

Utsu, Catalog of large earthquakes in the region of Japan from 1885 through 1980, Bull. Earthq. Res. Inst., Univ. Tokyo, 1982, 57, 401-463.

Veneziano, D., Cornell, C.A. & O'Hara, T. 1984. Historic method for seismic hazard analysis. Elect. Power Res. Inst., Report, NP-3438, Palo Alto.