

Nationwide site amplification mapping using GIS-based Japan engineering geomorphologic classification database

Masashi Matsuoka

Earthquake Disaster Mitigation Research Center, NIED, Kobe, Japan

Kazue Wakamatsu

Kawasaki Laboratory, Earthquake Disaster Mitigation Research Center, NIED, Kawasaki, Japan

Kazuo Fujimoto

Department of Risk and Crisis Management System, Chiba Institute of Science, Choshi, Japan

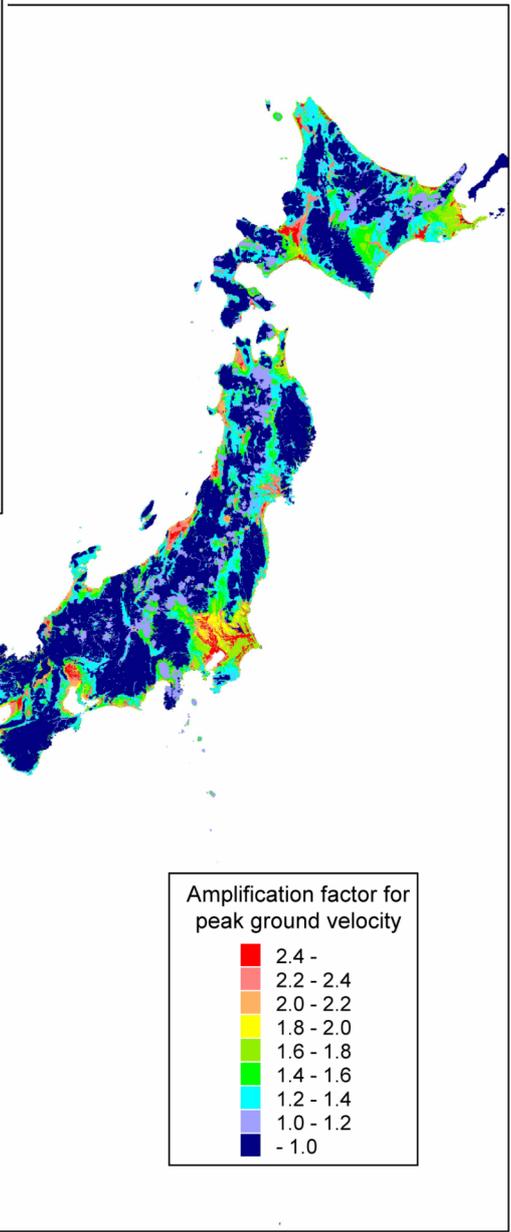
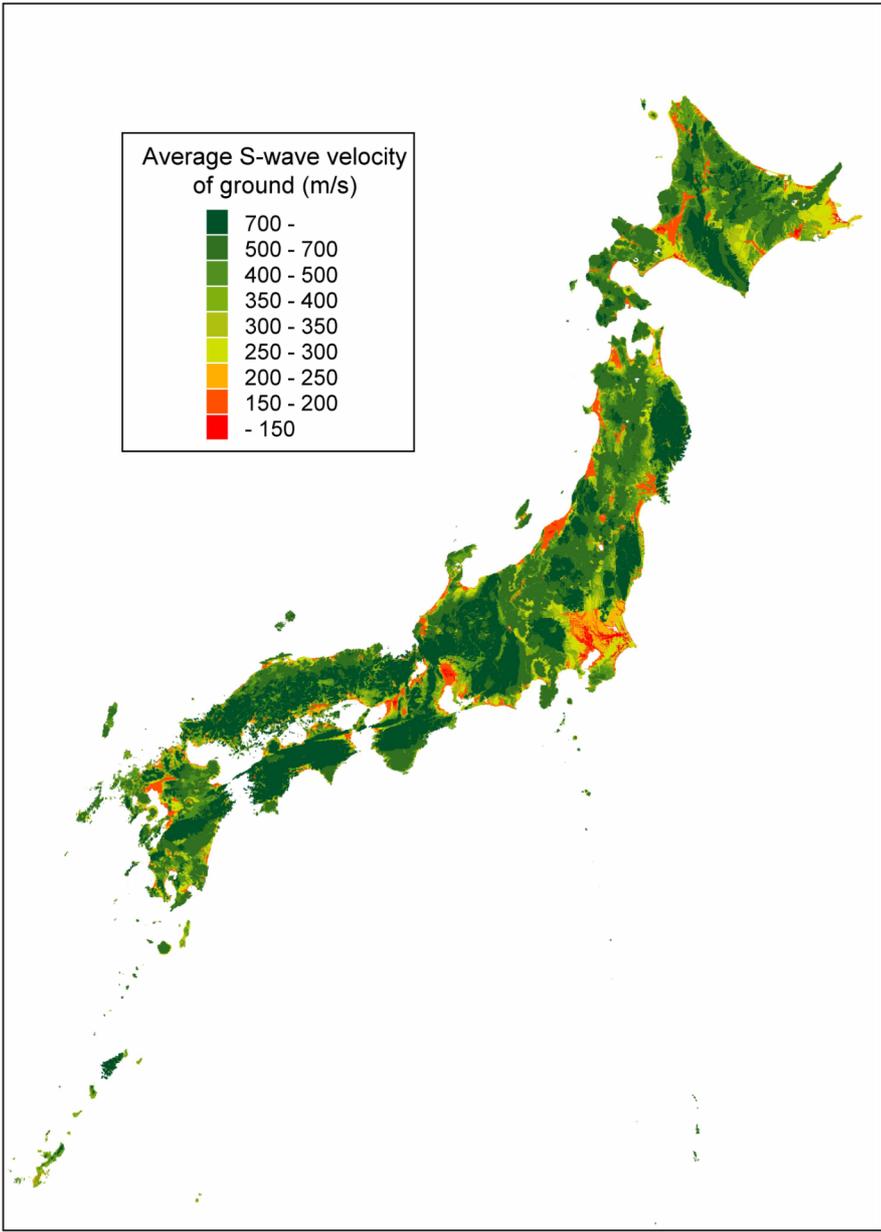
Saburoh Midorikawa

Center for Urban Earthquake Engineering, Tokyo Institute of Technology, Yokohama, Japan

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ABSTRACT: A mapping of shear-wave velocity for all of Japan is performed using “Japan Engineering Geomorphologic Classification Map (JEGM)” which has been developed as a GIS-based ground condition map. At first, we investigate relationships between the proposed geomorphologic classification unit of the JEGM and the average shear-wave velocity in the upper 30m (AVS30), which is a simple and useful predictor for estimating site amplification factors of peak ground velocity (PGV). The AVS30 is computed for approximately 2,000 sites where shear-wave velocity has been measured in all over Japan. Geomorphologic units for all boreholes logging data are interpreted using land-classification maps at a scale of 1: 50,000 that are the base paper maps for the JEGM. The average value and variance of AVS30 for each geomorphologic unit are then calculated. The mean AVS30s among geomorphologic units are found to correlate with the geomorphologic classification. Next, we examine the correlation between not only geomorphologic units but also geographic information derived from the JEGM and the AVS30 values. The AVS30s also show some dependency with elevations, slope gradients, and distances from mountains or hills. In order to develop the estimating model of the AVS30, multiple linear regression analysis is conducted using these geomorphologic indices. The standard error of the AVS30 estimation by using this model is 35%. Therefore, we can achieve to create an AVS30 map with relatively high accuracy for all of Japan using the JEGM. Thus, developed JEGM can be allowed detailed estimation of the site amplification factor of strong ground motion nationwide.

Average S-wave velocity map



Amplification factor map