

CONSTRUCTION AND WAVEFORM TESTING OF THE LARGE SCALE CRUSTAL STRUCTURE MODEL FOR SOUTHWEST JAPAN

PETUKHIN, Anatoly*, KAGAWA, Takao, KOKETSU, Kazuki, MIYAKE, Hiroe,
MASUDA, Tetsu and TURUGI, Masato

Keywords: *Crustal structure model, Uppermost crustal layers, Full waveform inversion, Long-period ground motion.*

SUMMARY

In order to simulate long-period ground motions due to the hypothetical subduction earthquakes we constructed three dimensional crustal velocity structure model of southwest Japan. The model is compiled from numerous physical explorations conducted in land and offshore areas and observational studies of natural earthquakes. Any available information is involved to explain crustal structure including results of refraction and reflection profiling, seismic tomography, analysis of seismicity receiver functions and gravity data, waveform modeling etc. The model is combined with a finely elaborated sedimentary structure model in order to better explain observed waveforms. Figure 1 shows an example of cross section with P-wave velocities.

The model has been revised through numbers of 3DFD simulations of small to moderate earthquakes as reproduce good agreement with observed arrival times, amplitudes, and also waveforms including surface waves. Low-velocity layers have added on seismological basement to reproduce observed records. The thickness of the layers has been adjusted through a full waveform inversion iterative analysis. For the case of a model having thin surface layers, we proposed and used numerically effective inversion method without time consuming calculation of the Jacobian. The final result is found to have good agreement with the results from other physical explorations; e.g. gravity anomaly.

Acknowledgements. This project is partly supported by the Support Program for Long-Period Ground Motion Hazard Maps by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The ground motion data used in this study were provided by National Research Institute for Earth Science and Disaster Prevention Disaster (NIED).

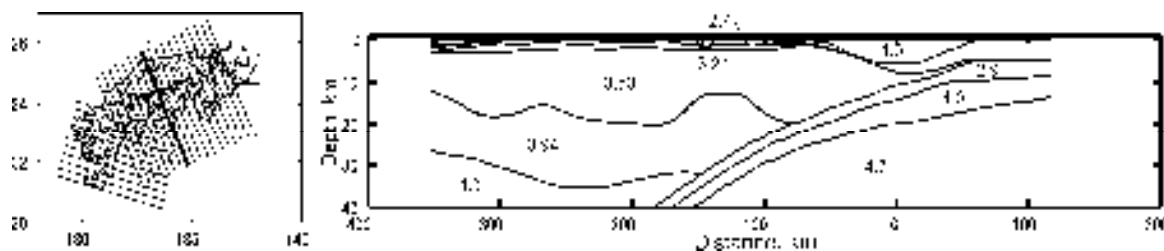


Figure 1 Example of cross section with P-wave velocities