

Crust and upper mantle structure of Southwest Japan from waveform modellings

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Shallow and intermediate-depth earthquakes in SW Japan recorded by the Hi-net seismic network are used in this work for studying the crust and upper mantle velocity structure. Generalized ray theory (Helmberger, 1974, 1983) is used for modelling local and regional waveforms. Integrated tools for calculating the ray responses and generating synthetic seismograms have been developed. An iterative technique has been developed for tracing the different seismic phases to retrieve the best model parameters. Several tests have been conducted to investigate the model parameter effects on the waveform modelling. The Conrad and Moho depths and crustal velocities have been changed to study their effects on the waveform modelling. The focal depths and mechanisms have been changed to study the accuracy of source parameters and their effects on the waveform modelling. Our test results show that synthetic seismograms are very sensitive to focal depth and upper crust velocity and thickness. The degree of fitting in each test is calculated by cross correlating the observed and synthetic seismograms. Lateral variations of the Conrad and Moho depths have been estimated. The P and S wave velocities of the crust and upper mantle have also been evaluated.

Our preliminary results of the waveform modelling show a sedimentary layer in the vicinity of Biwa lake area SW Japan. The Moho depth ranges from 31 to 33 km and Conrad depth varies from 15 to 19 km.

According to the best fittings obtained, we have constructed travel time curves for the most common crustal phases which can be used to identify later crustal phases during the modelling process.