

Crustal structure in and around the Miura peninsula, Japan, using off-line recorders.

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A deep seismic profiling around the Metropolitan Tokyo region, the Kanto district, started in 2002 under the project titled as the Regional Characterization of the Crust in Metropolitan Areas for Prediction of Strong Ground Motion. The deep seismic profiling, Tokyo Bay 2003, was performed along the major axis of the Tokyo Bay. Because the seismic line in the Miura peninsula passes through a densely populated area, we have a low signal-to-noise ratio data due to the cultural noise. Thus, in addition to the conventional reflection profiling, we deployed 51 off-line recorders with a 3-component geophone of 4.5 Hz at carefully selected, quiet receiver points. During 90 days, we had continuous records including many shot signals produced by vibrators on land and air-guns at the bay area. These data provided far-offset first arrival signals and wide angle reflections.

We focus on the common receiver gather records of the Tokyo Bay 2003 off-line stations data to identify first arrival and wide angle phases. We applied the first arrival tomography method using a finite difference travel time solver (Hole, 1992) to those data to obtain a 3-D P-wave velocity structure of the uppermost crust along the profile.

We obtained a velocity model in and around the Miura peninsula as follows: Across the Tokyo Bay, near surface is a layer with velocities of 2.0-3.0 km/s. A low velocity area corresponds to the fore-arc basin sediment (post Early Miocene) which extends to a depth of approximately 5 km. High velocity patches in a low velocity material (3.5-4.0 km/s) are located at a depth of approximately 3-6 km under the Miura peninsula, which we interpreted as Miocene accretionary prism including Pre-Neogene basement rocks

Finally, the velocity structure obtained by the tomography analysis is used to improve the processing of the reflection profiling data to clarify the deeper structure in the peninsula, including a good velocity constraint for a pre-stack migration of the reflection profiling data.