

Crustal structure beneath the Izumi Mountain and the Median Tectonic Line revealed by refraction/wide-angle reflection analysis

Ryuta Arai[1]; Takaya Iwasaki[2]; Hiroshi Sato[1]; Kiyoshi Ito[3]; Naoshi Hirata[1]; Naoko Kato[4]; Susumu Abe[5]; Taku Kawanaka[6]

[1] ERI, Univ. Tokyo; [2] ERI, Tokyo Univ.; [3] DPRI, Kyoto Univ.; [4] ERI; [5] JGI, Inc.; [6] JGI

A reflection and refraction/wide-angle reflection profiling was carried out in the seismic line across the Izumi Mountain in a north-south direction in 2006. The line extends on Izumisano city, Osaka prefecture, to Kinogawa city, Wakayama prefecture through the Izumi Mountain and Kino River, and is about 22km long. The Median Tectonic Line (MLT), with an east-west strike, is located at the southern end of the Izumi Mountain. Beneath the mountain, there presumably exists the MLT fault system dipping northward. The purposes of this experiment are to elucidate the configuration of source fault which has potentiality to cause significant damage around the Kinki region, especially the deep structure of the MLT fault system, and the velocity structure from this source fault to Kinki metropolitan area. This paper reports the seismic structure revealed by refraction/wide-angle reflection analysis.

Vibroseis shots with 4 vibroseis trucks at 6 locations were used as seismic sources in this experiment. The average interval of shots was about 4km. The sweep frequency was 6-30Hz. For data acquisition, the digital telemetry systems (G-DAPS4) were used. The average interval was about 40m and the total number of receivers was 555 for every shot.

The S/N ratio of the record was so high that we can pick first breaks in the whole records for every shot. We can also see some very clear reflections from deep boundaries. We determined the velocity structure up to about 2km deep by forward ray tracing from the travel times of first breaks. The structure shows the following features: There are 2 sedimentary layers with velocities of about 2km/s and 3km/s whose total thickness is about 0.5km beneath the Osaka Plain in the northern tip of the line. Beneath these 2 layers there is an upper crust with velocity of about 4km/s. The Izumi Mountain has the same feature, but we can find the velocity reversal across the Median Tectonic Line fault system because the two sedimentary layers are being subducted from south beneath the layer with velocity of about 4km/s. The velocity deeper than 1km is larger than 5km/s beneath the whole line. The upper boundary of this layer goes up in the southern part and almost reaches the surface at the southern tip.