Detailed S-wave reflection structures in the crust and the uppermost mantle in the Chugoku region by using local earthquakes

Issei Doi[1]; Kin'ya Nishigami[1]

[1] DPRI, Kyoto Univ.

We estimated the detailed seismic reflection properties in the crust and the uppermost mantle in the Chugoku region, southwest Japan, using local earthquakes in order to reveal the heterogeneous structure and its relation to the generating processes of the earthquakes there. We first conducted a reflection analysis of the aftershock waveforms in the source region of the 2000 Western Tottori Earthquake using ˜9,000 waveforms from aftershocks in order to estimate the very detailed reflection structures. Next, in order to investigate how these reflection zones detected in the western Tottori Region extend outside there, we analyzed the whole Chugoku region. From the analyses of these two steps, we delineated the Conrad and the Moho discontinuities and also the top surface of the Philippine Sea Plate beneath the Chugoku region. The depth of the Conrad discontinuity seems to change along the fault strike just beneath the hypocenter of the 2000 Western Tottori Earthquake. The Moho discontinuity is detected as a reflection zone at depths of 30-40 km in the source region of the 2000 Western Tottori Earthquake. We found that the Moho is also distributed widely, 100-120 km westward and 50-100 km eastward, and ˜50 km southward from there, and also the Moho seems to dip to the south. We detected the top surface of the Philippine Sea Plate at depth of 50-60 km in the source region of the 2000 Western Tottori Earthquake. This reflection zone also exists at least 100-120 km westward and 20-60 km eastward from there, and we found that the leading edge of the Philippine Sea Plate reaches the northern Chugoku region. We also detected other reflection properties, for example, at depths of 16-22 km beneath Mt. Daisen and Mt. Sanbe. The horizontal locations of these high reflection strength regions at depths of 16-22 km and the hypocenters of M6 earthquakes seem to have correlations. We found that the strengths of the seismic reflections are different between the two sides of the fault plane of the 2000 Western Tottori Earthquake and this suggests that the mainshock fault plane is located at the boundary of medium properties and that it has near-vertical downward extension in the lower crust.