

Seismic Reflection Image of Lithospheric Structure Beneath Shitara, Tokai, Central Japan

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Central Honshu lies above an active subduction zone where the Philippine Sea plate is being subducted beneath the Eurasian plate. A better understanding of the lithospheric structure of this region is important for assessing the risk of large mega-thrust earthquakes and also for understanding processes of continental growth. In order to define the deep geometry of major structures within the crust as well as the down-going slab, a deep seismic reflection profile was collected in the central part of Honshu, Japan. This experiment was performed as a piggy-back on a larger scale seismic experiment conducted by the Japan Marine Science and Technology Center and Joint Japanese University teams in late August, 2001. In the Shidara area, a 27-km seismic line was deployed perpendicular to the trench axis and major geologic boundaries. In the central part of the seismic line, 10-Hz vertical geophones, connected by a digital telemetry cables, were deployed over 15 km at a 50 m spacing. In addition, 100 TEXAN (Reftek 125) recorders with 4.5 Hz geophones were deployed at ca. 120 m-intervals for 12 km. A total of six shots with a maximum offset of 210 km, were clearly recorded by this dense receiver array. Near-vertical incidence data were obtained with recordings of a 500 kg shot at the northern end of this receiver array and a 100 kg shot at the southern end. The shots were recorded for 60 to 64 s at a 4 ms sampling rate. Records from these shots exhibit strong, layered reflections from 6 to 9.5 s, which we interpret as being derived from the lower crust. North-dipping reflections at 10.5 to 11.5 s can be interpreted as reflections from the down-going slab. Some north-dipping events from the middle and upper crust probably correspond to the deeper extension of the Median Tectonic Line and Butsuzo Tectonic Line, both of which extend for more than 1000 km along western Honshu and Kyushu Islands. The outstanding feature of the crustal structure is a possible wedge thrust structure in the back stop. The Cretaceous lower crust was suffered tectonic erosion by downgoing slab and accretionary complex has been penetrated into the middle crust forming associated with wedge thrusting. In spite of the distribution of the accretionary complex in the upper crust, the total amount of the continental crust was not increased due to the tectonic erosion of the lower crust.