

Seismic reflector inside the Philippine Sea plate

Takashi Iidaka[1], Hiroshi Sato[2], Tanio Ito[3], Kate Miller[4], Eiji Kurashimo[2], Tomonori Kawamura[5], Yoshiyuki Kaneda[6], Takaya Iwasaki[7]

[1] ERI, Univ. of Tokyo, [2] ERI, Univ. Tokyo, [3] Dept. Earth Sciences, Fac. Sci., Chiba Univ., [4] UTEP, [5] ERI, [6] JAMSTEC, Frontier, IFREE, [7] ERI, Tokyo Univ.

Introduction

The seismic structure of the subducting plate has been researched by many scientists. It was revealed that the subducting slab is not simple single-plane. At the top of the slab, low-velocity oceanic crust layer is located (e.g., Fukao et al., 1983). The heterogeneous velocity structure caused by thermal structure exists inside the slab (Iidaka et al., 1992). From petrological studies, the oceanic plate is considered to be layered structure. Several seismological studies also suggest that subducting Pacific slab consists of two layers (e.g., Iidaka and Mizoue, 1991). Several evidences for the existence of a boundary inside the slabs have been reported. However, it has been considered that the boundary is a local structure.

Data

A joint seismic experiment was conducted in the Tokai and central Japan area in 2001. The seismic records of shots J4, J5, and T6 are used. The seismic records of 391 seismic stations and seismic records obtained by recording systems with 400ch are used.

Results

Record sections of the shots show several boundaries with TWT(Two Way Travel-time) of 4-6 sec(R1), 8-12 sec(R2), and 12-15sec(R3). The R1 was interpreted as the lithological boundary between the Northern Shimanto belt and Southern Shimanto belt (Sato et al., 2001). The R2 is the upper boundary of the subducting Philippine Sea plate (Iidaka et al., 2003). The new boundary R3 is found. It was not detectable at the seismic survey of Iidaka et al. (2003). In the survey, the averaged spacing of the seismic stations is about 669m. It was not enough to detect the weak reflected waves from the deeper boundary.

The depth of the reflector is estimated to be 12-15 km from the upper boundary of the Philippine Sea slab. The depth is deeper than that of bottom of the oceanic crust. We conclude the reflector is not bottom of the oceanic crust. The reflector is also observed at the Shikoku area (Sato et al., 2003). As the boundary is observed at the two areas, the boundary is not local structure. We suppose the boundary inside the Philippine Sea plate should be observed at wide area.