

Seismicity and structure of slab, mantle-wedge around off-Torishima in Izu-Bonin Islands by ocean bottom seismographic observation

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1. Introduction

The Izu-Bonin trench is a subduction zone where Pacific plate subducts beneath Philippine Sea plate. In this area there are few large earthquakes occurred at the plate boundary. Kamimura et al. (2002) revealed that a low velocity ($V_p=7.3\text{km/s}$) area exists in the mantle wedge and extends to 120km west of the trench axis. These facts suggest no coupling on the plate boundary due to serpentine or water.

Ocean bottom seismic observation around off-Torishima in Izu-Bonin Islands revealed that most of earthquakes occurred in a subducted slab, and depths of these earthquakes are larger than 30km. There are no earthquakes between 10km and 30km on the plate boundary (Sato et al. 2001).

From re-analysis of the above seismic data using a method of hypocenter location in 3D structure, this paper presents structure of slab, mantle wedge and relocation of the hypocenters.

2. Observation and analysis

Ocean bottom seismic observation was conducted using 8 ocean bottom seismometers in July and August, 1999. We used R/V Keihu-maru to deploy and retrieve the OBSs. We relocate hypocenters using NLLoc program (Lomax et al. 2000) for various structure models. We set velocity of the mantle wedge, dip angle of the slab, and location of slab dip change point as model parameters of the structure. We calculate probability density function (PDF) for each model, then search the highest PDF model.

3. Results

The highest PDF model shows that the velocity of the mantle wedge is about 8km/s at 150km west of the trench axis. This means that the low velocity area is not widely spread in the mantle wedge. All of hypocenters are located in the slab mantle, no earthquakes occur at the plate boundary.

Acknowledgements

We thank the captain and the crew of R/V Keihu-maru for their support.