

Crustal reflector imaging around the Oligocene paleo arc in the Izu island arc deduced from OBS wide-angle data

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The Izu-Bonin island arc is a typical oceanic island arc formed by subduction of the Pacific plate beneath the Philippine Sea plate. In the fore-arc region of this arc, two paleo arcs (Oligocene and Eocene paleo arcs) run parallel to the volcanic front (Taylor, 1992). To understand the arc crust evolution and continental crust formation, the ultra-deep drilling to the middle crust of the Izu-Bonin arc has been proposed beneath the Oligocene paleo arc (IBM-4 site) (Tatsumi and Stern, 2006). Around the Oligocene paleo arc (IBM-4 site), the multi-channel seismic reflection (MCS) and seismic refraction study using ocean bottom seismographs (OBSs) surveys were conducted, however, this region is too deep to image the crustal structure by the MCS survey. On the other hand, in OBSs, wide-angle reflection phases reflected from reflectors in the crust are also visible. For this study, using the dataset of OBSs and the pre-stack depth migration (PSDM), we will image the seismic reflection profile in the crust around the Oligocene paleo arc.

The dataset of OBSs used this study is obtained by the wide-angle seismic survey from the volcanic front, the Oligocene paleo arc to the Eocene paleo arc in the fore-arc region off the east of Aoga-shima in 2008 (Yamashita et al., 2009). In this survey, 85 OBSs are deployed 1 km interval along this survey line having about 100 km.

In the result of PSDM, we could image the crustal structure where it was difficult to obtain reflection in the MCS profile. We find one reflector in the crust beneath the Oligocene paleo arc. It is the possible that this reflector correspond to the top of the middle crust. Moreover, the obvious reflector exists between the volcanic arc and the Oligocene paleo arc at about 15 km depth. This reflector possibly correspond the Moho.