

The forearc crustal evolution of Izu-Bonin (Ogasawara) region obtained by seismic reflection and refraction surveys

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The Izu-Bonin (Ogasawara)-Mariana (IBM) arc is known to be the typical oceanic island arc, and it is the most suitable area to understand the growth process of island arc. By previous seismic survey and deep sea drilling, convex basements are distributed along North-South direction in present forearc region. The convex basements are reported to be formed during late Eocene and early Eocene (Taylor, 1992). In IBM forearc region, the middle crust with 6 km/s is recognized by seismic survey using OBSs. In IBM region, four IODP drilling sites are proposed in order to understand comprehensive growth process of arc and continental crust evolution. Two of them are located in forearc region. Japan Agency for Marine-Earth Science and Technology (JAMSTEC) carried out multi-channel seismic reflection (MCS) survey using 7,800 cu.in./12,000 air gun and 5-6 km streamer with 444/204 ch hydrophones in the IBM region since 2004. We investigate the crustal structure beneath the Izu-Bonin forearc region for contribution of IBM drilling site along five long survey lines, which are across from present volcanic front to forearc basin. Seismic refraction survey is conducted across forearc region using 84 OBSs every 1 km interval in order to obtain detailed velocity structure beneath convex basement of paleo arc. JAMSTEC also conducted dense grid MCS survey around the late Eocene arc for proposed site survey.

Shallow crustal structure can be classified four units including basement which compared between previous drilling results and obtained seismic profiles. In IBM forearc region, thick sedimentary basin distribute from east side of volcanic front. Two convex basement peaks are identified in across profile of forearc region. These peaks are estimated the top of paleoarc (late and early Eocene) by geological sampling of previous ODP drilling. The half graben structure with major displacement is recognized from west side of present volcanic front to the top of late Eocene arc. On the other hand, there is no displacement of sediments between the late Eocene arc and early Eocene arc. This result shows the same origin of basement between the present volcanic front and late Eocene arc. There is long time difference of tectonic activity of sediments between the west and east side of late Eocene paleoarc. We would present the crustal condition before rifting between present volcanic front and late Eocene paleoarc by comparison of reflection and velocity structure.