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伊豆・小笠原弧の地下構造と超深部掘削
Active seismic studies in the Izu-Bonin arc and ultra-deep drilling

小平 秀一 [1*], 高橋 成実 [1], 佐藤 壮 [1]
KODAIRA, Shuichi[1*], TAKAHASHI, Narumi[1], SATO, Takeshi[1]

[1] 海洋研究開発機構
[1]Japan Agency for Marine-Earth Science and Technology

JAMSTEC has been conducting intensive active-source seismic surveys in the Izu-Bonin arc since the last decade. Those studies found many new observations to examine a formation process of an arc crust, and also provide fundamental information toward future IODP drilling in this arc. For examples, a large volume of felsic-to-intermediate component crust having Vp of 6.0 - 6.8 km/s is predominantly observed beneath basaltic volcanic centers along the current volcanic front. A recent high resolution seismic study at a site where an ultra-deep drilling to the middle crust is proposed near the volcanic front found that a layer having seismic velocity of ˜6 km/s is situated at 3-4 km below seafloor. We also discovered a similar along-arc-variation of the felsic-to-intermediate component crust in the rear-arc where another IODP drilling site is proposed. These findings suggest that the main part of the arc crust consisting of the felsic-to-intermediate component was created before the rear-arc has been separated from the volcanic front. Additional IODP drilling in this arc is proposed at a fore-arc close to the trench. A main objective of this proposal is to reveal a crustal formation process of an initial stage of crustal accretion in this arc. From seismic data obtained in the fore-arc, we found that the structure of the fore-arc region represents significantly different characters from that of the volcanic front; i.e., the seismic image along the Bonin ridge shows a remarkably thin crust which is seismologically identical to a typical oceanic crust as well as ophiolite. Petrological studies in the fore-arc region proposed a formation of oceanic crust associated with boninitic volcanism during an initial stage of subduction. The obtained seismic structures in the fore-arc strongly support this idea, which can be proved by the IODP drilling at the fore-arc area of the Bonin ridge.
Keywords: Izu-Bonin, Island arc, crust, seismic image