

Seismic image of the incoming oceanic crust entering the central part of the Japan Trench: structural variation caused by petite-spot, bend fault and seamount

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The structure of an incoming oceanic plate influences various seismic behavior in subduction zones. In the outer-rise region of the Japan Trench, young intraplate volcanism, called “petit-spot” volcanism, has been reported (e.g., Hirano et al., 2006). However, to date, only a few geophysical studies have focused on petit-spot volcanism and its modifying effects on the structure of the oceanic crust. In 2017, Japan Agency for Marine-Earth Science and Technology (JAMSTEC) conducted an active-source seismic survey in the trench-outer-rise region of the Japan Trench during cruise KM17-05 of R/V *Kaimei* (Ohira et al., 2018). For refraction studies, a large tuned airgun array with a total volume of 10,600 cubic inches was towed at 10 m depth and fired every 100 m. The seismic data were recorded on 40 OBSs deployed along a 100-km-long line (line A4) with a spacing of 2 km. The multi-channel seismic (MCS) reflection data were collected by R/V *Kairei* using a 6,000-m-long, 444-channel streamer cable during cruise KR11-05 and KR15-07. On the MCS reflection section, we imaged opaque reflections at the top of the oceanic crust and a weak or absent Moho reflection under petit-spot volcanoes. The P-wave velocity model obtained from first-arrival traveltimes tomography showed the large velocity reduction at the top of the oceanic crust near petit-spot volcanoes. This velocity reduction can be interpreted as fractures, hydration, and high porosity associated with petit-spot volcanic activity, as well as by the development of bend faulting (e.g., Fujie et al., 2018) and ancient fractures (Fujie et al., 2016). Our results suggest that petit-spot volcanism is one of the contributing factors leading to structural variation and modification of the incoming oceanic plate prior to its subduction. In 2018, additional new seismic reflection data from 25 –50 km interval of profiles were acquired during cruise KM18-06 of R/V *Kaimei* to cover the outer-rise region from 38°N to 36°N at the south of the petit-spot region. The new data provide along-strike structural variations attributed to petite-spot, bend fault and seamount.

Keywords: Japan Trench, Outer-rise, Seismic survey