

# Discontinuities in the acoustic basement horizon at the outer-rise region of the Japan Trench

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The nature of the subducting oceanic plate has a great influence on the seismic activity after the subduction. There have been several large earthquakes occurred in the Japan Trench subduction zone and outer rise region (e.g., 1896 Sanriku Earthquake & 1933 Sanriku Earthquake). To elucidate the mode of occurrence of these earthquakes, it is important to study the shallow crustal structure of the incoming oceanic plate of Japan Trench outer rises region. For this purpose, the "Portable Multi-Channel Seismic Survey System" of the Atmosphere and Ocean Research Institute (AORI) of the University of Tokyo was installed on the academic research vessel *Shinsei-maru*, and Multi-Channel Seismic (MCS) surveys were conducted on survey KS-19-05 in April 2019 and KS-20-14 in September 2020.

After the data processing, the existence of petit-spot volcanoes referred by Hirano et al. (2006) was confirmed in the survey lines located offshore Sanriku and Miyagi. Depending on the relative position of the petit-spot volcano and the Japan Trench, the development pattern of normal faults is different. Offshore Sanriku, where the petit-spot volcano Site A referred by Hirano et al. (2006) was located near the trench axis, the reflection horizon of the chert layer disappears within 75 km from the trench axis, and the polarity of the top layer of the acoustic basement is reversed. The presence of petit-spot volcanoes disturbs the acoustic basement of the MCS profile has been reported by many previous studies, but this is the first time that the polarity reversal is uniform over such a wide area. To further interpret this phenomenon, it is necessary to refer to the observation results of other survey lines in the same area. In this study, we have reprocessed the data from the MCS survey conducted by JAMSTEC since 1997 in addition to the MCS data from the *Shinsei-maru*, and interpreted the MCS profile in the Japan Trench outer-rise region over a wide area.

As the result, 1) as same as the *Shinsei-maru* survey line, wide area of the chert layer reflection horizon disappears also confirmed in MCS profile from other survey line offshore Sanriku region. 2) Around the Japan Trench outer-rise area, some MCS profile have discontinuous acoustic basement. It intermittently shifted to the top of the chert layer and the signal strength increased abnormally. This phenomenon was frequently observed in the area where the outer rise region began to rise.

Keywords: Japan Trench, Outer-rise, Multi-Channel Seismic survey, Acoustic basement