

Resistivity structure and Coast effect of the Pacific plate on the seaward slope of the Japan Trench, off Sanriku

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SUMMARY

The occurrence of plate boundary earthquakes is related to the presence of water in the rock. Friction at the plate boundaries depends on the water content released from subducting oceanic plates. It is important to investigate the distribution and quantity of water in subducting plates for elucidating their impacts on plate boundary earthquakes. Fujie et al. (2023) report lower seismic velocities at the uppermost mantle in the Pacific plate, at the beginning of the subduction zone. However, we have not clarified the water presence below several ten kilometers in the mantle and its relationship with such low velocity zones. This study measured electromagnetic field data at the seafloor on Pacific plate off the coast of Sanriku, Japan, which is near the area by Fujie et al. (2023). We estimated the subsurface resistivity structure by the magnetotelluric method on the basis of one-year electromagnetic field data. We estimated the subsurface resistivity structure by the magnetotelluric method on the basis of one-year electromagnetic field data.

The seafloor topography in the study area is complicated, and apparent resistivity could be considered largely affected by the topography. Based on forward calculations from various resistivity models and types of seafloor topography, we discuss the effect of topography and required mesh sizes that could explain the observed apparent resistivity features. Finally, our inversion result with assumption of two-dimensional structure show that the resistivity of lithosphere in the target area seems to lower than ones in the typical Pacific plate shown in the previous studies.

Keywords: magnetotelluric, Oceanic lithosphere and asthenosphere, the Pacific plate
