

Seismic structure model of asperity area of the 1968 Tokachi-oki event, revealed by a seismic refraction survey

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The northern part of the Japan trench is one of the most active seismogenic zones in the world. Great earthquakes have occurred every 80-100 years in the off-eastern Aomori region. This region is one of the most well-studied subduction zone in the world. However, hypocenters were not determined accurately by the land seismic network. Therefore, we began earthquake observation on the estimated rupture area of the 1968 Tokachi-oki earthquake, to understand the seismic activities around the rupture area, using long-term type ocean bottom seismographs (LTOBSs). In this study, we present a two-dimensional seismic structure obtained by seismic refraction experiment.

In December 2004, we started the observation in off-eastern Aomori region, and retrieved 18 LTOBSs using vessel in October 2005. The seismic survey with controlled sources was conducted to obtain a crustal structure of source region of 1968 Tokachi-oki earthquake using R/V Hakuho-maru.

To determine the seismic structure, we used the forward modeling using two-dimensional ray tracing method developed by Zelt and Smith (1992). The result shows large heterogeneities of the island-arc crust. The seismic survey data reveal a high seismic velocity body in the island-arc crust. The depth of the island-arc Moho vary from 15km to 25km below the sea surface.

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