

Deep structure of the Kuril Trench forearc offshore Hokkaido with multi-channel seismic survey data

*Hiroto Yamaguchi¹, Shuichi Kodaira², Gou Fujie², Nobukazu Seama¹

1. Kobe university, 2. Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

The Kuril Trench forearc region offshore Hokkaido has contrasting seafloor topography, with a narrow forearc basin Nemuro-oki which is tucked between the continental shelf and the trench slope, and a wide forearc basin Tokachi-oki. Positive gravity and geomagnetic anomalies, which are thought to be caused by Cretaceous volcanic activity, have been observed Nemuro-oki. On the other hand, Tokachi-oki is observed geomagnetic anomalies are small and strong negative gravity anomalies. It is necessary to organize the structure, but no precise survey has yet been conducted. JAMSTEC have acquired multi-channel seismic survey(MCS) in 2000, 2019, and 2020 at 9 Lines in order to elucidate the subsurface structure including these regions. In this study, we use these data to summarize the characteristics of the subsurface structure at the forearc region. The MCS show significant differences between the Tokachi-oki and Nemuro-oki. Tokachi-oki is observed fold, the anticline interval is as short as 8 km and the displacement is larger than 1 km in the western part, while in the eastern part, the anticline interval is as long as 23 km. The thickest deposits in the forearc basin are stratified up to 4,000m on the syncline of the folds. This indicates that the forearc basin has been sinking for a very long time. The sediments are thinner on the anticline, less than 500 m thick. The reflection of the stratified sediment base in Tokachi-oki is weaker than that in Nemuro-oki, and in some places it is so weak that it is difficult to distinguish, but the unevenness is small and shows consistent sedimentation. Folds and faults are developed in the direction sub-parallel to the trench axis at Nemuro-oki. The lower part of the sediment show folds and faults, which is covered by stratified sediments bounded by indistinct (unconformable) reflections. In the line perpendicular to the trench, many normal faults show tension, and the forearc basin fell by normal faults. Some of the faults retain sedimentary unconformities that suggest at least three times of activity, suggesting that the forearc basin may have been depressed intermittently. The difference in the structure of the forearc regions Nemuro-oki and Tokachi-oki suggests that the forearc basin is formed by different mechanisms.

Keywords: Kuril Trench, forearc basin, MCS