Normal fault mapping based on seismic reflection data and bathymetry data for tsunami prediction from outer-rise earthquakes off the southeastern coast of Hokkaido, Kuril Trench

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Even before the 2011 off the Pacific coast of Tohoku Earthquake (the Tohoku-Oki earthquake), it was pointed out potential for the occurrence of normal fault earthquakes (outer-rise earthquakes) on the outer slopes of trenches related to the occurrence of large plate boundary earthquakes. Furthermore, since that time new data have been acquired, via seismic and bathymetric surveys and seismic observations (e.g., Obana et al., 2021), around the Japan Trench; source fault mapping and tsunami simulation were conducted based on these data (Baba et al., 2020). In order to conduct the same study in the Kuril Trench as in the Japan Trench, we have been acquiring new data by seismic surveys and bathymetric surveys.
The seismic data used in this study consisted of 34 seismic lines obtained from multichannel seismic reflection (MCS) surveys, although two types of data were acquired from a high-resolution seismic reflection survey using a 1500 m streamer cable and a 380 in^3 air gun on JAMSTEC R/V *YOKOSUKA*, and from a 5550 m streamer cable and a large-volume air gun array on JAMSTEC R/Vs *KAIREI* and *KAIMEI*. To analyze the MCS data obtained by *YOKOSUKA*, we applied noise suppression processing for example to remove random noise, and then performed poststack depth migration imaging. To analyze the MCS data obtained by *KAIREI* and *KAIMEI*, we focused on suppressing multiple reflection and random noise, and then conducted broadband processing via deghosting followed by prestack depth migration using the velocity model by grid tomography.
For the bathymetry data, we reprocessed the data acquired by the JAMSTEC vessels for the areas not covered by those data, we filled in SRTM15+ (Tozer et al., 2019), GEBCO (GEBCO Compilation Group, 2019; 2020), and previous research data (Japan Coast Guard and JAMSTEC, 2011). We processed the junction of the bathymetry data to avoid inconsistencies as much as possible. In addition, we created a red relief image map (Chiba et al., 2008) and attribute-processed images of dip angles and azimuths based on digital elevation model (DEM) data and used these images to evaluate spatial connectivity of fault.
In this presentation we report our results on normal fault mapping on the seaward slope of the Kuril Trench, from the Erimo Seamount to the Nosappu Fracture Zone, by importing the results of previous studies (Nakanishi, 2011), MCS data, and bathymetry data into Schlumberger's Petrel. Part of this study was supported by a JSPS Grant-in-Aid for Scientific Research (A) 20H00294.

Keywords: Kuril Trench, Outer-rise earthquake, Multi-channel seismic reflection survey, Bathymetry data

