# Research project for varve sediment cores collected from Lake Harutori, Kushiro City, eastern Hokkaido: primary research results and future prospects

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In the Kuril subduction zone (Kuril-Kamchatka subduction zone) located off the Pacific Ocean in the eastern Hokkaido, large earthquakes of the M8 class have occurred every several decades, and the coastal areas have often suffered tsunami damage. Are known. In recent years, it has been found that tsunami deposits, which are suspected to be traces of M9-class megathrust earthquakes such as the 2011 off the Pacific coast of Tohoku earthquake, are widely distributed in multiple horizons. On the other hand, the coastal areas of eastern Hokkaido are widely distributed with marshes and sea lakes formed after the Jomon transgression, where traces of the earthquake and tsunami have been preserved (Nanayama et al., 2003).

Lake Harutori is a coastal lagoon that exists in the city area where seawater enters through the Harutori River mouth. In the Jomon period, it was an estuary to inner bay environment, but after that, a sand barrier was formed in Chiyonoura. Our ice drilling survey revealed that there are 22 layers of tsunami deposits on the bottom of the lake (Nanayama, 2021).

In our study, we investigated the sedimentation of the surface layer of the lake bottom for the purpose of investigating how the environment around the lake was changed by the modern tsunami and what kind of transition it followed using varve lamina. We are currently conducting various analyzes by collecting samples. A sediment survey was conducted at Lake Harutori from August 1 to 14, 2022. After measuring the salinity distribution and the topography of the lake bottom, we collected columnar sediment cores using the Mackerras piston corer at three sites in the western part of Lake Harutori near the Pacific Ocean. Most of the lacustrine sediments of Lake Harutori consist mainly of laminated or massive mud layers, and the former are known to be annual vereved lamina.

We observed two layers of marine sand presumed to be tsunami deposits, Ko-c1, Ko-c2 tephra derived from the Hokkaido Komagatake Volcano, and Ta-a, Ta-b tephra derived from the Tarumai Volcano in the three sediment cores. According to comparison with Nanayama (2021), these tsunami sand beds are correlated with tsunami deposits from the 12th/13th century megathrust earthquakes (GTS2) and tsunami deposits from the 17th century megathrust earthquakes (GTS1). For these columnar sediment cores, soft X-ray photographs were taken for each 25 cm long slab deposit to investigate the sedimentary structure of the tsunami layer and the sediment between them. After the slab was collected, sediment samples were collected at 1 cm intervals and analyzed for diatoms. Fresh brackish Cyclotella spp. were abundant immediately after the tsunami deposits, but they have decreased since then.

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References

Nanayama, F., 2021, Evidence of giant earthquakes and tsunamis of the 17th-century type along the southern Kuril subduction zone, eastern Hokkaido, northern Japan: A review. In Dilek, Y., Ogawa, Y. and Okubo, Y. eds., Characterization of modern and historical seismic–tsunamic events, and their global–social impacts, Special Publications, 501, 131-157. https://doi.org/10.1144/SP501-2019-99
Nanayama, F., et al., 2003, Unusually large earthquakes inferred from tsunami deposits along the Kuril Trench. Nature, 424, 660-663. https://doi.org/10.1038/nature01864

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