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# A study on the interaction between extreme waves and coastal development processes for identification of tsunami and storm deposits in the tsunami far-field

**Ryo Nakanishi**[1,2], Juichiro Ashi[1,2], Yusuke Yokoyama[1,3,4], and Yosuke Miyairi[1]
[1]The University of Tokyo, Atmosphere and Ocean Research Institute, Ocean floor geoscience, Kashiwa, Japan (n-ryo@g.ecc.u-tokyo.ac.jp)
[2]Graduate School of Frontier Science, University of Tokyo, Kashiwa, 277-8561, Japan 3 Department of Earth and Planetary Sciences, Graduate School of Science, The University of Tokyo, Japan
[3]Department of Earth and Planetary Sciences, Graduate School of Science, The University of Tokyo, Japan
[4]Graduate Program on Environmental Science, Graduate School of Arts and Sciences, The University of Tokyo, Japan

In order to estimate the size and the origin of giant tsunamis, it is useful to investigate “tsunami far-field” as the coastal area far from the source. However, it is challenging to distinguish a tsunami deposit from an extreme storm deposit in these areas. In this study, we report sand layers induced by extreme waves on the coast of Hokkaido, Japan, facing the southern Kuril Trench. In the study area (central part of the Hidaka coast), it is said that the tsunamis caused by observed earthquakes have never exceeded the dune or beach. However, geological evidence indicates that giant earthquakes and tsunamis occurred at intervals of several hundred years in the Kuril Trench, and the traces of these tsunamis are still unclear in the Hidaka region.

The study area can be classified into the inland zone consisting of peatland and the seaward zone consisting of floodplain muds by the paleo beach ridge. We identified three volcanic ash layers and three to four sand layers with clear boundaries to the ordinary mud layer in each zone. However, there are large gaps in the ages of the sand layers discovered in both inland and seaward zones, and their distributions are limited (ranging from a few tens to 100 m from the ridge at that time) and do not overlap. To understand the peculiarities of the depositional age and distribution of the sand layers, we clarified the sedimentary environmental changes and sea-level index in the late Holocene by analyzing the diatom assemblage and CNS of the mud layer. The inland zone showed the paleoenvironments from the sandy tidal flat formed by the transgression in the mid-Holocene to the beach ridge formed by the regression, and the sheet sand layers were formed only during the period of the beach ridge development. On the other hand, the seaward zone showed various changes due to the formation of meandering rivers and beach ridges associated with the regression, and the formation of recognizable event layers is accompanied by changes in the depositional environment, such as the opening of lagoons and rapid changes to upland. Thus, especially in the tsunami far-field, the preservation potential of the event layers is strongly influenced by the coastal development and relative sea level, and such geological information will provide clues to identify the origin of the sand layer. In the presentation, the numerical simulation

of the paleo-tsunami considering the reconstructed relative sea-level change and topographic development will be reported.