Geological Record of Tsunamis and Storms Influenced by Relative Sea-Level Change, Southern Hidaka Coast, Hokkaido, Japan.

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In the last a few hundred years, southern Hidaka coast in Hokkaido was suffered from large tsunamis by subduction of the Pacific Plate along the southern Kuril Trench. 2003 Tokachi-oki earthquake left traces at maximum altitude 4 m in Hyakunin Hama in the eastern part of Cape Erimo, also maximum altitude 3 m in western part of Cape Erimo. It was caused by the edge wave propagating from Cape Erimo along the west coast of the Hidaka area (Tanioka et al., 2004) . On the other hand, geological studies in eastern part of Hokkaido revealed that intervals of outsized tsunamis by Kuril subduction inferred average nearly 400 years but range widely from about 100 to about 800 years (Sawai et al., 2009), and these probably reached western part of Cape Erimo. However, the only 17th century tsunami deposits reported in the western part of Cape Erimo are said to be unknown the trigger. Thus, This study conducted Simple boring survey to reveal tsunamis cycle and age of emergence in Northern Hidaka coast. Consequently, we compared western part and eastern part of Cape Erimo about scale of tsunamis, also examined the relationship with the paleo environment.

As a result of boring survey by a geoslicer in the peat swamp behind the beach, we found three volcanic ash layers and nine event sand layers in the humus and the peat. In order from the top, it was AD 1663 Us-b tephra, AD946 B-Tm tephra, two sand layer (Us1, U1), 2700-2500BP Ta-c2 tephra, seven sand layer (U2-8). Peat layers change to remarkably undegraded humus from the U4 layer downward. The number of sand layers decreased landward, finally being zero at about 500 m from coastline. U1-8 sand layers were similar in particle size and gray color to beach sands, and sorting very well. These common characteristics were from inverse to normal grading and contain rip-up clasts. Also, grain size and thickness were inverse correlation with distance from coastline, but no correlation with distance from river. Because the diatom assemblages from event sand layers contained marine, brackish and terrestrial species in contrast peat occupied by freshwater species, these turn out to derive from seaward. Conversely, the Us1 layer had limited distribution several tens meter from paleo beach ridge, the thickness changed from 20 cm to very thin at only 20m landward. Grain size of the Us1 layer was fine - very coarse, including Φ1cm flat gravel. The Us1 layer can be supposedly distinguished from U1-8 layers from these features similar to storm deposits. A result of measuring ages for the time of sand deposition by AMS radiocarbon dating, we obtained the age of about 5500BP from under the U8 layer, about 2000BP from above the U1 layer. The average recurrence intervals of event is nearly 400 years, the interval is sometime shorter (50 years) or longer (550 years) than the average, so the U1-8 event layers are probably tsunami deposits by subduction earthquakes like seen in eastern Hokkaido.

The U7 layer is the thickest in all sand layers, thickness of event layers tend to become thinner as the upper stratigraphy. The U7 layer is most widely distributed inland, it deposited in about 4900BP, when high-standard period in eastern Hokkaido (Dura et al., 2016). It was found from the result of continuous chemical analysis of peat samples in the vertical direction that Fe and S increased as deeper at the depth deeper than the U5 layer (about 3800BP). In this site, considering the humus layer shows undegraded under the U4 layer, this chemical characteristic imply that the peat was reductive and the sea-level was high at that time. We inferred that tsunamis inundated over the sand ridge in this area only for 5500BP to

2000BP, because didn’ t find tsunami deposits from the stratigraphy since 2000BP. In conclusion, when restoration of paleo tsunami record, it necessary to consider that changing sea-level and associated topographic change.

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Keywords: Tsunami deposits, Storm deposits, Kuril subduction, Radiocarbon dating, Paleo environment restoration, Holocene High Standard

