

Thickness, gravel content, and gravel size distribution of historical and paleo-tsunami deposits in Koyadori on the Sanriku Coast, northeast Japan

*Daisuke Ishimura¹, Keitaro Yamada²

1. Department of Geography, Tokyo Metropolitan University, 2. Graduate School of Science, Kyoto University

Characteristics of tsunami deposits (e.g., particle size, grain composition, thickness, and sedimentary structure) are the most fundamental information to describe tsunami deposits and reflecting conditions of tsunamis (tsunami height and flow velocity) and site settings (beach sediments and tsunami flow process). The information might allow us to reconstruct the paleo-tsunami's flow speed, inundation height, and wavelength. In this study, we extracted some parameter of tsunami deposits and estimated relative magnitudes of paleo-tsunamis based on comparison of historical tsunami deposits.

We used historical and paleo-tsunami deposits in Koyadori on the Sanriku Coast, northeast Japan, where Ishimura and Miyauchi (2015) identified eleven historical and paleo-tsunami deposits, including the 2011 tsunami deposits. They named them E1 - E11 deposits in descending order and correlated E1 to E3 deposits with the 2011 Tohoku-oki tsunami, 1896 Meiji Sanriku tsunami, and 1611 Keicho Sanriku tsunami, respectively. Additionally, these tsunami deposits are composed of granule to pebble beach gravels (rounded gravels).

We used three parameters of tsunami deposits: thickness, gravel content, and gravel size distribution. Thickness of each tsunami deposits is measured using the trench-wall sketches and core photographs. We also calculated average thicknesses of them. Gravel content was measured by sieving method, using the E1 - E11 tsunami deposits obtained from the trench and cores. Furthermore, we applied image analysis to measure long/short axis lengths, perimeters, areas, aspect ratio, and circularity, using sieved gravels of the E1 - E11 tsunami deposits .

As a result, there was no significant difference in each gravel size distribution. However, average of thickness and gravel content are different from each tsunami deposits, especially those of the E1 to E3 deposits are consistent with the magnitudes of historical tsunamis. These facts potentially mean that the differences of average thicknesses and gravel contents are indicators of the transport process from the beach to the study site.

Keywords: tsunami deposits, Sanriku Coast, 2011 Tohoku-oki tsunami, gravel size distribution