

Tsunami Deposits obtained from Long Geoslicer Survey in Koajiro Bay on the Miura Peninsula, Kanagawa, Japan

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We have conducted single channel acoustic reflection survey and Geoslicer survey at the Koajiro Bay, which locates in the southwestern part of the Miura Peninsula, in order to reveal preceding histories to the Genroku event in the great Kanto earthquake sequence. As a result, five event layers are identified at 0-2 m depth which deposited during past 1500 years. Among these, the upper three event layers can be correlated with tsunami deposits obtained at the head of Koajiro Bay. The result in this survey is consistent with Shimazaki et al. (2011), who suggested that the 1293 earthquake which caused destructive damage in Kamakura, the capital in those days, was the antepenultimate Kanto earthquake.

The great Kanto earthquakes (M₈) occurred in 1703 and 1923 between the continental plate and Philippine Sea plate. However, the occurrence time of the antepenultimate Kanto earthquake have not been revealed although some candidates are proposed based on geological or geomorphological surveys and/or historical documents (e.g., Ishibashi, 1991, 1994; Shishikura, 2003). Shimazaki et al. (2011) conducted handy Geoslicer survey at the head of Koajiro Bay and identified three tsunami deposit layers, probably due to the 1923, 1703 and antepenultimate Kanto earthquakes (1060-1400 AD). Single channel acoustic reflection profiling identified many continuously-distributed reflective layers, which suggests that tsunami deposits due to the previous Kanto earthquakes are probably preserved. Thus, we conducted long Geoslicer survey at the inner Koajiro Bay and obtained 6 cores (2 cores x 3 locations) with a length of 4-6 m.

From the observation, coarse layers, which consist of mixture of materials such as shell fragments, mud clasts, gravels, and coarse sandy sediments, are identified at 0-2 m depth. These coarse layers are significantly distinguishable from inner bay deposits which consist of fine sand, silt and clay. Five possible event layers were identified from the grain size analysis with an interval of 2 cm.

The uppermost event deposit locates at just below the seafloor. Palmer-sized gravel flatly deposited at the other core with the depth corresponding to the second event deposit. The radiocarbon (¹⁴C) age of 1560-1820 AD (2sigma, including calendar year calibration and marine reservoir correction) was obtained from barnacle attached at the upper part of the gravel. This is consistent with ¹⁴C ages of marine shells uplifted by the 1703 Kanto earthquake (Shishikura et al., 2007) and thus, barnacle possibly attached after the gravel has been conveyed by the 1703 Kanto earthquake tsunami. The ¹⁴C age of 1230-1400 AD and 1210-1280 AD were obtained from gamopetalous clam and wood within the third event deposit. These ¹⁴C ages indicate that the upper three layers can be correlated with tsunami deposits which were identified from handy Geoslicer survey in the head of Koajiro Bay. The occurrence time of antepenultimate Kanto earthquake estimated from this survey is after 1210 AD and it supports that the 1293 earthquake was the antepenultimate Kanto event.

The fourth event layer deposited 720-1280 AD based on ¹⁴C ages. It is difficult to identify corresponding historical earthquakes because of large uncertainty although some damaging earthquakes (e.g., the 818 and 878 earthquakes) are documented. The fifth event layer deposited 560-690 AD.

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