

Paleo-tsunami deposits and their ages in Shima Peninsula, Mie Prefecture

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As indicated by 1300-year historical records, Pacific coast of central Japan including Shima Peninsula was repeatedly suffered by tsunamis occurred along Nankai Trough. It is certainly noted that tsunamis inundated the region in 1096, 1498, 1605, 1707, 1854 and 1944. Written records successively document earthquakes and tsunamis along Nankai Trough, although these before 17th century are relatively sparse and in some cases described only certain regions, and needs to be complemented by geological records to reconstruct past seismic activities. This study aims to reveal tsunami history of thousands of years that complement and extend existing past tsunami records.

The study site is coastal lowland formed by filling of a drowned valley behind a barrier spit. Wetland lower than 1 m distributes more than 700 m inland at the site. The natural height of the barrier spit is not certain because of bank construction, though the height except for the banking is 2.8 m. Two past tsunamis probably exceeded the barrier spit. Estimated inundated heights at a site about 2 km apart from the study site of the 1707 Hoei and 1854 Ansei-Tokai earthquake tsunamis were 3.5 m and 3.9 m respectively (Namegaya and Tsuji, 2005).

Coring at Shijima lowland in Shima Peninsula exposed possible paleo-tsunami sand layers. The sedimentary succession is composed of lower 6-8 m thick lagoon deposit of shell-rich silt with sand /gravel layers and upper 3-4 m thick marsh deposit of organic-rich silt. The organic-rich silt is intercalated with more than 7 sand layers with bioclasts of gastropod, bivalve, calcareous algae and foraminifera. In most cases, these sand layers are few centimeters thick and have sharp basal contact. Some of the sand layers are graded or composed of two or more sub-layers of paired sand and silt.

Radiocarbon ages of seeds, leaves and woods indicate that these shell-rich sand layers deposited in the last 4000 years and that younger two sand layers were deposited just after AD 780-990 and AD 1390-1450 respectively. The sand layer dated just after AD 1390-1450 observed at sites more than 550 m inland implying its wide distribution. Though additional dating is needed, part of these candidate paleo-tsunami layers would be correlated with historical tsunamis such as the 1096 and the 1498 earthquake tsunamis.

Strong candidate for subaerial sedimentation of widely distributed marine sand is tsunami, though it is arguable that the shell-rich sand layers were deposited by storms or other extreme phenomena other than tsunami. This interpretation should be supported by additional investigation including analysis on microfossil assemblage that can be changed due to uplift/subsidence simultaneously occurred with paleotsunami event.

Keywords: tsunami deposit, Shima Peninsula, Nankai Trough