

Geological records of prehistoric tsunamis and subsidence at Mugi town, Tokushima Prefecture

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Pacific coasts of western Japan along the Nankai-Trough have been inundated repeatedly by tsunamis associated with subduction-zone earthquakes. Their magnitudes and damages are mainly estimated from written documents. However, written documents before the Edo period are fragmentary and in many cases there is only a description about some areas. Also, records during thousand years are required to estimate giant earthquakes of which recurrence interval is considered from several hundred to a thousand years such as the 2011 off the Pacific coast of Tohoku Earthquake. Moreover, correlation of geological data from various regions helps us to evaluate rupture zones of past earthquakes. To reveal history of earthquakes and tsunamis in eastern Shikoku Island, we conducted field surveys at a coastal lowland in Mugi Town, Tokushima Prefecture.

Hand coring, radiocarbon ages and diatom analysis indicated that at least three tsunamis occurred during 4,400–5,600 years ago. The higher content of brackish–marine species of diatoms in four sand layers suggested that the layers had been deposited by seawater inundations, rather than some processes that supply terrestrial materials. Diatom assemblages also suggested that marine influence at the core location had increased after the depositions of three of the four sand layers. We attributed this to subsidence at the studied area associated with subduction-zone earthquakes, as observed in the 1854 Ansei-Nankai and the 1946 Showa-Nankai earthquakes. The three sand layers had similar sedimentary structures such as erosional basal contacts, normal and inverse grading structures to previously reported modern tsunami deposits. Taken together, we concluded that the three sand layers had been deposited by tsunamis. Ages of the three tsunami deposits at the study site were correlated with tsunami inundations previously reported at Minami and Toyo towns, about 30 km away from Mugi town, which implies that these tsunamis were generated from subduction zone earthquakes in Nankai Trough and affected wide range of eastern coast in Shikoku region.

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