

Preliminary results of a paleotsunami study by hand coring in coastal lowlands, eastern Kyushu

Masaki Yamada^{1*}, Shigehiro Fujino², Takashi Chiba², Kazuhisa Goto³, James Goff⁴

¹Graduate School of Life and Environmental Sciences, University of Tsukuba, ²Faculty of Life and Environmental Sciences, University of Tsukuba, ³International Research Institute of Disaster Science, Tohoku University, ⁴Tsunami and Natural Hazards Research Group, University of New South Wales

The AD1662 Kanbun Hyuga-nada, AD1707 Hoei, AD1769 Meiwa Hyuga-nada and AD1854 Ansei Nankai tsunamis that occurred along Nankai Trough and Hyuga-nada all struck the east coast of Kyushu (Hatori, 1985). In particular, the AD1662 Kanbun Hyuga-nada tsunami inundated the extensive Miyazaki Plain, and based on the historical documents Hatori (1985) estimated that the inundation height was 4-5 m. The fault rupture area of the AD1707 Hoei earthquake is thought to have extended to the west of the Cape Ashizuri (Furumura et al., 2011) with the resultant tsunami being about 3-4.5 m high at the northeast coast of Kyushu, although it was thought to have been comparatively small in the southeast (Hatori, 1985). However, if the rupture area of an earthquake was to extend further west, a higher tsunami could strike the southeastern coast of Kyushu.

Paleotsunami deposits in stratum provide helpful information for disaster risk reduction such as the inundation area and recurrence intervals of paleotsunamis that have no historical records. However, studies of paleotsunami deposits do not cover all of the Pacific coastal lowlands of Japan at the current moment. In eastern Kyushu, sandy paleotsunami deposits were reported from Ryujin Lake in Oita Prefecture (e.g., Matsuoka and Okamura, 2008), but there has been no detailed study of paleotsunami deposits in the south of the Miyazaki Prefecture. The purpose of this study is to reveal the tsunami history over thousands of years in eastern Kyushu by using paleotsunami deposits.

We started a preliminary research of paleotsunami deposits by hand coring coastal lowlands in Kagoshima, Miyazaki and Oita prefectures in March 2012. In this presentation, we mainly discuss geological data obtained from coring at Kushima lowland, Miyazaki Prefecture. This 550 m wide drowned valley lowland faces Shibushi Bay and is surrounded by 10-30 m high hills. We conducted core logging at 19 study points along 300 and 450 m shore-perpendicular transects and collected samples for radiocarbon dating and diatom analysis.

The 4-6 m sedimentary successions of these study sites are composed from bottom to top of fine to medium dark-gray sand with granular, green-brown organic-rich silt, black-brown organic-rich peaty silt, blue-gray clay and agricultural soil. Several sand layers was found in the organic-rich peaty silt and blue-gray clay at many study points. Marine and brackish diatoms were found from sand layers at around the boundary between the lower green-brown organic-rich silt and the upper organic-rich peaty silt. This indicates a possibility that these sand layers were transported inland from sea area by a high energy flow. Although they could have been deposited by paleotsunamis, more criteria such as lateral consistency in the sedimentary succession are needed for identification of these layers as paleotsunami deposits. Using diatom analysis, we will also examine the environmental changes that might have occurred simultaneously with deposition of the sand layers.

Keywords: tsunami deposit, Kyushu, Miyazaki Prefecture, Nankai Trough, Nankai earthquake, Hyuga-nada earthquake