

Character and history of dammed-lakes formed by landslides and their deposits in Toyama Prefecture, central Japan

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Tertiary Green Tuff formations, represented by the Iwaine Formation, are widely distributed in central part of Toyama Prefecture, and cause many landslides. At Kiritani, Koinami and Nuketotameike in Toyama City and Nawagaike in Nanto City are dammed-lakes formed by landslides or landfill basins made from the dammed-lakes. Kiritani is the intermountain basin formed by the Akakurayama landslide along the Kubusu River. Many boreholes have been drilled during the landslide prevention works and the construction of the Kubusugawa (man-made) dam, and by using these data we can estimate the subsurface geologic structures. Thickness of the dammed-lake sediments is estimated to be about 30 m at the maximum. Wood fragments and carbonaceous materials embedded within the landslide sediments at the base of the slide block yield ^{14}C ages of 2520 \pm 25, 2530 \pm 25, 2535 \pm 30 and 2545 \pm 25 BP, which indicate the age range of the primary landslide. The ^{14}C ages of plants included in the uppermost part of the dammed-lake sediments and the sediments accumulated in the depression (?) on the slide mass are 129 \pm 29 and 135 \pm 23 BP, respectively. The ages might indicate the secondary landslide in 1836 described in old documents. The Koinami basin is smaller than Kiritani, and was formed by the landslide along the Besso River. The buried forest composed of many stumps, about 2-5 m in diameter, were recovered from the lake sediments during the land improvement of 1977-79, one of which yields the ^{14}C age of 2475 \pm 30 BP. Nawagaike is the lake dammed by landslide along the Ike River, a branch of the Yamada River, and the upper part of the lake has been buried by sediments and now become a swamp. The swamp sediments were drilled by the hand-auger boring device to obtain three cores 190-240 cm in length. The cores are subdivided into the upper part composed of mud with abundant plant roots and the lower gravelly part rich in clastic materials and fine-grained plant remains. The lithological transition indicates change of sedimentary environment at the boundary. The ^{14}C ages are 245 \pm 30 (130 cm depth), 300 \pm 30 (150 cm), 1090 \pm 30 (210 cm) and 1160 \pm 30 (228 cm) BP; the average depositional rate is about 2 mm/year. Large-scale landslides are generally triggered by earthquake or heavy rainfall. Although we could not determine the inducing cause of the landslides about 2500 BP in Kiritani and Koinami, if the landslide was caused by an earthquake, the Atotsugawa fault is one of the most probable candidates on the basis of the recurrence interval and last event.