

## Formation and erosion processes of the landslide dam, triggered by the AD 714 Totoumi earthquake, on the Toyama River

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Many buried trees were found in the Toyama River between Oshima and Kizawa in the Minamishinano of the Iida city, southern Nagano prefecture. The dendrochronology clarified that the tree was buried in the AD 714. This age was the same year as the occurrence of the Totoumi earthquake that was inscribed in the early historical documents. Hence, the huge landslide, triggered by this earthquake, was damming across the Toyama River at the Oshima, and the trees along the river were buried in succession (Teraoka et al., 2006). We surveyed around this area to clarify the processes of both formation and erosion of the landslide dam.

The landslide dam was made of the avalanche and/or debris flow deposits that were supplied as alluvial cone from the tributary. Thereafter, the four terraces were formed by erosion of the flow on the alluvial cone. Highest position of terrace is about 80m upper from the river floor. The deposits of the landslide dam were divided to the lower layer and the upper one. The lower layer was constituted from the ill-sorted and matrix-supported sandstone breccia (Breccia-1). The upper layer was constituted from the mainly clast-supported breccia composed green rock, sandstone and chert blocks, its size were up to 12m in size (Breccia-2).

The mainstream terraces, which were 40m in the maximum relative height, were found in the upper reaches of the Oshima. The aerial photographs and the geographical survey showed the five terrace surfaces (T1-T5); they go low toward the upstream side. T3 terrace was constituted by the lake sediment layer (6m) sandwiched between the upper (1m) and lower (1.5m) gravel layers. The size of lake sediment grain was from silt to clay. The thickness of the lake sediment layers implies that the lake continued over 100 years. The lower gravel contained buried trees that died in AD 714.

We infer that the formation and erosion of the landslide dam are as follows;

- 1) The landslide dam was formed by the two events. The first event was that the debris avalanche (Breccia-1) buried the Toyama River at Oshima. Then, it formed a lake in the upstream of Oshima. The forest was buried under the water and/or fluvial deposits along the river. On next event, much debris flow (Breccia-2) covered the deposit of Breccia-1. Consequently, its new alluvial cone formed a bigger lake than the former one.

- 2) After the second event, the landslide dam and the lake had been kept about 100 years.

- 3) The landslide dam was eroded gradually not burst, after 4 or 5 terraces formed. The buried forest appeared in the streambed, because of recent rapid erosion.