Development of Lake Shibire related to landslides in western part of Misaka Mountains, central Japan

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Lake Shibire is a small circular lake without an outlet in montane environment. Although the origin of Lake Shibire has been discussed by the previous authors (e.g. volcanic crater, meteoroid impact, and landslide), conclusive evidences have not been presented yet. We have performed integrated research on geology and geomorphology of Lake Shibire and its adjacent areas. Geomorphological mapping with GIS, geological survey in the field, radiometric dating and tephrochronology of lacustrine sediments, and core drilling of riparian terraces enabled us to reconstruct the late Quaternary landscape evolution of Lake Shibire.

Initially, Lake Shibire was formed by large landslide at 50 cal BP. A closed depression on the main landslide body was inundated. At almost the same time, two subsidiary landslide-dammed lakes occurred around the main landslide body. Later, the initial landslide lake was separated into two lakes (the east and the west lakes) by the secondary landslide activity around 47 cal ka. The western lake has been continued to exist until present but the eastern lake was dissected by valley head incision in the late Holocene. Two subsidiary lakes were also extinguished but the timing was not unclear. A buried soil layer embedded in lacustrine sediments beneath a riparian terrace surface indicates that elevation level of Lake Shibire around 3.5 cal ka was 0.95 m lower than today. We concluded that both the present Lake Shibire and its ancestral paleolakes were created and affected by repeated landslide activities since 50 cal ka. Other theories of the origin should be rejected.

Keywords: landslide, dammed lake, lacustrine deposit, 14C date, late Pleistocene

