Stepwise lowering of water-level caused by tectonic events occurred during 50-15 ka in the Paleo-Kathmandu Lake, central Nepal Himalaya

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In order to reconstruct continuous record of South Asian monsoon during the last one million years, lacustrine sediment of 200 m in thickness was drilled by the Paleo-Kathmandu Lake drilling project [1]. Multi-proxy analyses of the drill core, called the Rabibhawan core, by means of fossils pollen and diatom, clay mineral, organic chemistry and smear slide observation, revealed changes in South Asian monsoon and lake environment in middle to late Pleistocene ranging from 750 ka to 15 ka[2, 3, 4]. Changes in lake water-level were estimated based on the ratio of planktonic and benthic diatom, and interrelationship between the ratio and dry-wet climatic condition (indicator of strength of South Asian monsoon) obtained from pollen and clay mineral analyses [3]. However, another cause of change in water-level by tectonic control, e.g. discharge of lake water by destruction of dam by faulting, has been never discussed. In this paper, we report stepwise lowering of water-level of the Paleo-Kathmandu Lake, and discuss on the possible causes of discharge of lake-water.

In the southern half of the Kathmandu basin, lacustrine-delta sediments of the Sunakothi Formation is distributed covering the lacustrine clay sediments of the Kalimati Formation. AMS^{14}C age of the uppermost part of the Kalimati Formation, about 1 m below the erosion surface, shows 51191 cal BP. Thus, abrupt lowering of the lake-water seems to have occurred around 50 ka.

This event is recorded in the core of lacustrine sediments deposited in the central part of the lake. We found abrupt rapid increase of the phytolith of Gramineae at ca. 59-46 ka (31.4-37.4 m in depth) and ca. 38-33 ka (24.4-26.4 m in depth), though all of the proxy: number of pollen, charcoal grain, sponge spicule and phytolith, show cyclic changes. Pollen analysis of the two periods suggest that paleoclimate was relatively warm and wet, judging from occurrence of *Castanopsis* and *Mallotus*, and decrease of ratio of nonarboreal pollen such as Chenopodiaceae and *Artemisia*. Furthermore, pollen of Cyperaceae and green algae of *Pediastrum* rapidly increased in this interval. Those facts suggest that shallow water area expanded in the two periods. Therefore, we interpreted that two lake water-lowering events were not controlled by climate but caused by tectonic events.

In fact, in the southern part of the basin, active fault Chandragiri Faults is running, and liquefaction and slump of the clayey lacustrine deposits can be observed at several places nearby the fault.

Sedimentological study of lacustrine delta sediments in the northern part of the basin, revealed water-level decreased at about 39 ka [5, 6]. This event seems to correspond to the discharge events.

Lake-water in the central part was completely discharged at about 15 ka, and lacustrine sediments were eroded by river. We interpret that this event is also caused by active faults in the south. In the southern Kathmandu basin, 4-5 m thick lacustrine clayey sediments covering the Sunakothi Formation are distributed around Champi. These are interpreted to be local and ephemeral lacustrine sediments after discharge of the Paleo-Kathmandu Lake.

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