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Late Holocene change in lacustrine environment inferred from diatom fossil analysis of lake bed core

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Detail diatom fossils analysis of a lake bed core provided successive reconstruction of lacustrine environmental change after ca. 4700 cal BP in the Lake Hamana, central Japan, with high temporal resolution. In addition, two suspected thin layers as some kind of event deposits were recognized based on allochthonous sediments and/or diatom fossils.

Lake Hamana is a coastal brackish lake located along the Enshu-nada coast. Ikeya *et al*. (1990) performed numerous geological and paleontological analyses on lake bed sediments and reconstructed roughly the Holocene lacustrine environment and geomorphological development of the lake. According to them, after sea area had expanded landward associated with the Jomon Transgression, an inner bay and a fresh water lake occurred at a relatively stable sea-level condition. Furthermore, Morita *et al*. (1998) suggested that fresh water and brackish water conditions had been formed alternately during the Late Holocene, which indicating geomorphological changes presumably caused by some mega thrust earthquakes occurred in the Nankai trough. However, lower temporal resolution made impossible them to clarify detail lacustrine environmental changes.

In order to reconstruct detail lacustrine environmental change of the Lake Hamana during the Late Holocene, diatom fossil assemblages of the 350 cm-long lake bed core were investigated. The core sediments consisted of muddy deposits mainly including a thin sandy layer and two obvious tephra layers. The refractive index of volcanic ashes and core stratigraphy indicated that the lower tephra layer was the Amagi-Kawagodaira pumice (Kg, 3126-3145 cal BP, Machida and Arai, 2003) and the upper one was the Fuji-Osawa scoria (Os, 2.5-2.8 ka, Machida and Arai, 2003). The age model of the core was reconstructed based on the tephra layers and seven radiocarbon ages.

Six diatom zones were identified based on major species composition changes in the diatom assemblages. Stepwise development of the lacustrine environment in the Lake Hamana was suggested as below: Vigorous seawater inflow inferred by marine diatoms (Stage I, 4600-4700 cal BP); A closed inner bay environment with laminated sediments due to formation of sand barriers (Stage II, 4500-4600 cal BP); A circulative brackish lacustrine environment by active mixture of riverine fresh water with enhanced inflow of seawater since 3500 cal BP (Stage III, 2650-4500 cal BP); Gradual salinity decrease of the lake water by reduced seawater inflow (Stage IV, 2250-2650 cal BP); Lake water from brackish to fresh since 2250 cal BP with intermittent salinity increase in the middle of this period, water depth of the lake getting deeper (Stage V, 1498 AD-2250 cal BP); Re-development of an inner bay environment after the Meio earthquake in 1498 AD with temporal salinity increase during 1600 AD to 1750 AD (Stage VI, after 1498 AD).

Additionally, two possible event layers (A and B layer in ascending order) were found. The A layer, during 321-322 cm depth, was characterized by exceptionally high percentage of *Plagiogramma* sp. This temporal abundance accompanying increases of *Thalassiosira* sp. and *Thalassionema nitzschioides* indicates an abrupt environmental change and/or an allochthonous sediments supply. Nevertheless, it is difficult to specify the cause of this layer because the habitat of *Plagiogramma* sp. is still unknown. On the other hand, the B layer was corresponding to the thin sand layer in the range of 285-288 cm depth showed short-term abundance of fresh water diatom species. This indicates that relative coarse sediments supplied abruptly from fresh water environment, ponds and/or marshes, around the lake to the central part of the lake.

Reference
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Morita, H. *et al*. 1998. Laguna 5, 47-53.
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