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Paleoenvironmental study of the late Quaternary. based on diatom analysis of a sediment core from Lake Biwa, Japan

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To reconstruct paleoenvironment in a mid-latitude region during the late Quaternary, fossil diatom abundance and assemblage character were examined for the BIW08-B core taken from Lake Biwa.BIW08-B core is 100.3m in length and consists mainly of homogeneous silty clay except for 20-m-thick sandy sediments in the core bottom. According to an age-model based on the marker tephra beds, this core can cover over the last 300,000 years. Based on the diatom assemblage characters, the following 7 zones were distinguished stratgigraphically.

Zone 1: Planktonic diatom *Stephanodiscus suzukii* is dominant.
Zone 2: Benthoic diatoms such as *Navicula* spp. and *Achnanthes* spp. are dominant.
Zone 3: *Aulacoseira nipponica* is dominant.
Zone 4: *Cyclostephanos* sp. is dominant.
Zone 5: *Stephanodiscus suzukii* is dominant.
Zone 6: *Aulacoseira nipponica* is dominant.
Zone 7: *Stephanodiscus suzukii* is dominant.

These stratigraphic changes of diatom assemblage are consistent with the results of diatom analysis in the other cores. Therefore, quasi-periodic changes of aquatic environments have been occurred commonly in the whole Lake Biwa. The abundance of diatom valves also fluctuates quasi-periodically, and corresponds roughly with the temporal variation of the East Asia summer monsoon strength in periodicities of tens of thousands of years.

In order to investigate the causes of diatom assemblage change, detailed diatom analysis was performed in interval of 300 years for the sediment of the last 25,000 years, when *S. suzukii* and *A. nipponica* occupy 80% of the total diatom. Abundance of diatom valves is ordinarily poor (1.0×10^8valves/g) until 7,000 years ago. It has much increased only after 7,000 years ago. This fluctuation is inconsistent with precipitation change or intensity variation of the East Asian summer monsoon. Diatom valve concentration may respond to climate change late, or not reply straight to rapid warming and precipitation increase.

Then, to search diatom survival strategy, the diameter of *S. suzukii* , which were dominant species in this period, was measured and its frequency distributions were analyzed for the last 25,000 years. Between 25,000 years and 12,000 years ago, total number of diatom was constantly low and frustule sizes were small (7-12 micrometer). On the other hand, the proportion of individuals of larger valves (20-30 micrometer) increased between 12,000 and 7,000 years, even though frustules abundance is still low. Diatom (*S. suzukii*) took the survival strategy to change cell size for the transitional period from the LGM to the Holocene. That is to say, *S. suzukii* changed its size in response to rapid warming and survive the competition with other diatom such as *A. nipponica* . Diatom valves variation might respond tardily to the climate change, because it takes time to shift the survival strategy.

Keywords: Lake Biwa, Late Quaternary, Diatom, Frustule size, Stephanodiscus suzukii