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# Variability of diatom productivity and its control mechanism in the Late Pleistocene Takano Formation, Japan

Takuma Ito[1*], Fujio Kumon[2], Tatsuhiko Sakamoto[3], Koichi Iijima[3]

[1]Nagano City Museum, [2]Shinshu University, [3]JAMSTEC

A 54-m-long lacustrine sediment core was taken from the Late Pleistocene Takano Formation, southern Nagano City, Japan in 2004. This sediment consists of homogeneous clayey silt with many tephra beds. Paleoclimate has been reconstructed by total organic carbon and nitrogen contents (Tawara et al. 2006; Kumon and Tawara 2009). This study provides the insights into the past diatom productivity and its control mechanism from the major elements and lamina preservation degree.

This sediment covers from 160 to 30 ka on the basis of the tephrochronology using the four tephras such as Aso-2, -3, -4, and BW1466 (Nagahashi et al. 2007). The temporary resolution of this study is between 100 and 300 years.

$SiO_2/Al_2O_3$ ratio of this sediment can be regarded as a proxy of diatom productivity, because of having correlation between $SiO_2/Al_2O_3$ ratio and biogenic silica content (Ito et al. 2010). The periods showing high diatom productivity are correspond that having high lamina preservation degree. Moreover, lamina preservation degree shows high during the periods having high $Fe_2O_3/Al_2O_3$ ratio, which has significant correlation with siderite content in the sediments. Because siderite can be formed under anoxic environment, the lamina preservation degree can be regarded as the proxy of the anoxic environments in the lake floor.

Diatom productivity shows similar variation with relative climate change in this region reconstructed by pollen assemblage. This fact indicates the local climate change controls diatom productivity.

According to the above results, the control mechanism of diatom productivity can be considered as follows. Local climate change leads to change of lake circulation patterns, and subsequently it affects the oxygenation degree in the lake floor, which controls nutrients supply to the photic zone in which diatom productivity supports during the seasonal overturn periods.

Diatom productivity variation has 20-kyr periodicity as orbital-scale, thus it seems to be controlled by precessional cycle, which is one of the Millankovich cycles. Significant millennial-scale periodicity is also evident, and this finding may show that local climate change in Nagano City experienced the rapid climate change such as Dansgaard-Oeschger cycles in the Late Pleistocene time.

**References**

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