

Relationships between climate parameters, chlorophyll a of lake water and TOC of sediment in Lake Kizaki, central Japan

Fujio Kumon[1]

[1] Environmental Sci., Shinshu Univ.

Recent studies of total organic carbon (TOC) and total nitrogen (TN) contents in lake sediments have clarified a strong relationship between their amounts and climates estimated by pollen analysis and other proxies. We suppose that these proxies should be useful as temperature proxies for a long time, the genetic cause and mechanism, however, are not well understood yet.

Fortunately, Kizakiko Observation Group of Shinshu University has been observed continuously limnological conditions of Lake Kizaki from 1981, and monthly data of water temperature, chlorophyll a (chl.a) and transparency have accumulated for 20 years. Total of chlorophyll a in a whole water column is regarded as a proxy of lake productivity in this study. Meteorological data are from AMeDAS station in Omachi, 5 km south of the lake.

Lake sediment of 35 cm length was newly taken from the center of the lake on December 12, 2003 by Satake-type corer. The cored sediment was cut lengthwise, and described in detail. The sediment was cut in 0.5 cm interval, and water content, TOC and TN contents were measured in same interval. Diatom composition is also checked to compare the former core taken in 1983. On the basis of comparison between the cores of 1983 and 2003 and flood sediment identification, we recognized sediment ages precisely enough to compare the sediment with modern limnological and meteorological data.

As a result, only winter average temperatures have positive relation to annual chl.a ($r=0.65$) and is also positive with TOC in sediment ($r=0.52$). Annual chl.a amount also has a positive relation with TOC ($r=0.65$). Warm winter of high average temperature means a winter of short cold period, and this condition elongates the season of whole convection of lake water which cause a bloom of phytoplankton. This high bioproductivity seems to increase organic matters in lake sediment.