

琵琶湖の湖底堆積物の磁気特性に残された東アジア・モンスーンの変動の記録

Environmental Magnetic Record of the East Asian Monsoon from Lake Biwa Sediments

林田 明^{1*}, 安田 雅彦¹, 山本 朋弘¹, 北川 浩之², 竹村 恵二³

Akira Hayashida^{1*}, Masahiko Yasuda¹, Tomohiro Yamamoto¹, Hiroyuki Kitagawa², Keiji Takemura³

¹同志社大学工学部環境システム学科, ²名古屋大学大学院環境学研究科,
³京都大学大学院理学研究科地球熱学研究施設

¹Doshisha University, ²Nagoya University, ³Kyoto University

Lake Biwa is a unique fresh-water basin located in central Japan, which contains a thick sedimentary sequence deposited in lacustrine or fluvial environments during the Pleistocene. Based on tephrochronological and paleo-climatological data, the uppermost 250-m clay unit is correlated to major glacial-interglacial cycles for the last 430,000 years. Hence, Lake Biwa sediment is expected to offer detailed records of Asian monsoon activity since the Middle Pleistocene. We present here an environmental magnetic record from piston-core samples of 10 to 20 m long, which were recovered from central part of Lake Biwa in 2007. Along with widespread tephra layers, magnetic concentration parameters, initial susceptibility (k) and anhysteretic remanent magnetization (ARM), were used for core-to-core correlations. Continuous data of k was also useful in finding dispersed volcanic ashes. Reflecting abundance of fine-grained magnetic minerals, characteristic features of ARM variations provided tie-points in clayey sediments. Then a composite age model was constructed based on published ages of widespread tephra units and AMS radiocarbon dates from our core.

A previous work on a Lake Biwa piston-core showed that ARM data shows a variation similar to total organic carbon (TOC) content, interpreting that fine-grained magnetite flux was increased during the post-glacial and interstadial warm periods as well as flux of wash-in nutrients and organic matter, probably associated with enhanced precipitation. The ARM data from new cores, which extend back to 46 ka, are consistent with the previous data. These records show resemblance with the oxygen isotope records from the Greenland ice core (NGRIP) and stalagmites from Hulu Cave in China, featuring major interstadials of Dansgaard-Oeschger cycles and Heinrich events. Thus rock magnetic properties of Lake Biwa sediments provide a good proxy of environmental change associated with activity of the East Asian Monsoon.

キーワード:琵琶湖,環境磁気学,モンスーン,ダンスガード=エシュガー・サイクル,
ハインリッヒ・イベント

Keywords: Lake Biwa, environmental magnetism, monsoon, Dansgaard-Oeschger cycles, Heinrich events