Paleomagnetic and rock magnetic studies of sediment cores in Lake Biwa off Nagahama.

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The sediment samples are obtained by piston corer at six sites in Lake Biwa in 2007, intending to recover high-resolution records of paleoenvironmental and paleomagnetic data for the last 50,000 years. In this study, using the cores of BIW07-3 (water depth 30 m, 8.60 m long), BIW07-4 (water depth 40 m, 8.71 m long) and BIW07-5 (water depth 50 m, 13.77 m long) obtained at three sites off Nagahama, we conducted paleomagnetic and rock magnetic analysis.

The three sediment cores are mainly composed of massive clay (gray or dark gray), including several layers of widespread volcanic ashes. Sand layers were found just below Aira-Tn (AT) volcanic ash layer in Core BIW07-3. Clear color boundaries (dark bluish gray) were found at 3.20 m depth in BIW07-3 and at 3.40 m depth in Core BIW07-4. Judging from the interbedded widespread volcanic ashes, the bottom part is estimated to be dated at about 50 ka (BIW07-3), 45 ka (BIW07-4), and 60 ka (BIW07-5). Analyzed samples were continuously obtained by 7 cc plastic cube cases. We performed measurements of initial susceptibility (X) and its anisotropy (AMS), the assessment for the stability of natural remanent magnetization (NRM) with progressive alternating field demagnetization experiments (PAFD) and the acquisition experiments of anhysteresis remanent magnetization (ARM). Yasuda et al. and Hayashida et al. reported measurement results of X, AMS and NRM from Cores BIW07-3 and BIW07-5 in Japan Geoscience Union Meeting 2008. In this time, we mainly report the results of Core BIW07-4.

X values showed the spike-like maximum at each volcanic ash. Additionally, the characteristic minimum boundary was observed at the clear color in BIW07-4. Primary sediment fabrics of AMS were observed clearly; the shape of AMS ellipsoid is oblate and the minimum axis of AMS directs vertically. However, the disturbance of the sedimentary fabric was found above 2.40 m depth, indicating the deformation of the core.

PAFD results showed that almost all samples had stable and well-defined single magnetic components which linearly decay toward the origin of the Zijderveld diagram at the PAFD levels above 15-20 mT. The variation of the remanent directions after the alternating field demagnetization at 20 mT seems to be generally correlative to those of Cores BIW07-3 and BIW07-5.

In Cores BIW07-3 and BIW07-4, X_{ARM} values gradually decreased from the top down to AT volcanic ash layer (ca. 28.8 ka). Below the ash layer, the values increased downward and then decreased again in the bottom part. The downcore variation in X_{ARM}/X values, except for volcanic ash and sand layers, was similar to that of the X_{ARM} ones. It was found that the increase (decrease) in the amount of magnetic minerals was accompanied with their grain refining (coarsening) in the grain size of magnetic minerals. In the clear color boundaries, a steep drop in the amount of magnetic minerals with a slight decrease of the grain size was recognized. Hayashida et al. (2007) reported an environmental magnetic record and paleosecular variation data for the last 40,000 years from the sediment core in Lake Biwa off Shirahige (water depth 67 m; BIW95-4). The variation of X_{ARM} values in the core is almost similar to those in the cores in this study. The common trend of the variation in the amount of magnetic minerals is regarded as a characteristic feature influenced by the environmental change in the whole Lake Biwa. Two minimums of X_{ARM} between Kikai-Akahoya (ca. 7.25 ka) and AT volcanic ash layers in Core BIW95-4 were not clear in the cores off Nagahama, which may reflect the difference in sedimentary environment between the two areas.