Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SEM21-P04 会場:コンベンションホール 時間:5 月 25 日 15:30-16:45

琵琶湖北湖第一湖盆における湖底極表層堆積物の磁気的特性の地域的な特徴
Regional variation in magnetic properties of topmost sediments in the first depression of the Northern Lake Biwa

石川 尚人 [1*], 石川可奈子 [2]
ISHIKAWA, Naoto[1*], ISHIKAWA Kanako[2]

[1] 京都大学大学院人間・環境学研究科, [2] 滋賀県琵琶湖環境科学研究センター
[1]Graduate School of Human and Environmental Studies, Kyoto Univ., [2]Lake Biwa Environmental Research Institute

Rock-magnetic analyses have been performed on topmost sediments cored at the deepest part (91m water depth) of the first depression in North Basin of Lake Biwa for clarifying effects of early diagenesis on magnetic properties of the sediments and for investigating response of the magnetic properties to seasonal variation of dissolved oxygen (DO) content in bottom water, which is one of factors controlling early diagensis. The following results have been obtained (Asami et al., in preparation): (1) the downcore decrease of magnetic coercivity occurs in uppermost sediments above about 10 cm below sediment surface (bss), and the content and grain size of magnetic minerals (magnetite or maghemitized magnetite) subsequently decreases and increases downcore, respectively, (2) in uppermost sediments above 10 cmbss magnetic coercivity and the presence of magnetic minerals with characteristic low-temperature magnetic property, as mentioned later, change seasonally associated with seasonal variation of DO content in the bottom water. In order to reveal these magnetic features in detail, we further conducted rock-magnetic analyses of topmost sediments cored at ten sites with different water depth in the first depression in Northern Lake Biwa. The DO content of bottom water at the ten sites changes seasonally. The Do value becomes lower than 4 mg/L in winter (November and December) at seven sites with the water depth deeper than 80 m among the ten site. Sediments cores of about 30 cm long were taken in summer (June-July) and winter (November-December), 2009.

Low-temperature magnetometric results from surface sediments above about 1 cmbss of all sites indicated the presence of magnetite or maghemitized magnetite. Warning curves from 6 to 300K of isothermal remanence (IRM) imparted at 6K in 1T after zero-field cooling showed a remarkable decrease of IRM between 90 and 120K, which may be regarded as a suppressed Verway transition of magnetite. Magntite or maghemitized magnetite is considered to be the principal magnetic mineral controlling magnetic properties in room temperature in Northern Lake Biwa. The warning curves of the samples at the deeper seven sites also showed another IRM decrease between 20 and 30K with the inflection point at about 29K. The IRM drop was detected more clearly in the samples taken in winter, when the bottom water showed the lowest DO value. It seems that the magnetic mineral with the characteristic low-temperature magnetic behavior exists at the deeper part with low DO bottom water in the first depression, and that the occurrence of the mineral is influenced by seasonal change of the DO values. Frederichs et al. (2003) reported low-temperature IRM decay curves of Fe-bearing rhodochrosite similar to those of our samples. A ferro-rhodochrosite may be a possible candidate as a magnetic mineral showing the IRM transition at about 29 K in our samples although the presence of ferro-rhodochrosite has not been reported from topmost sediments in Lake Biwa (e.g., Kawashima, 1985).

キーワード: 琵琶湖, 堆積物, 磁気特性, 岩石磁気学, 初期続成作用
Keywords: Lake Biwa, sediments, magnetic property, rock magnetism, early diagenesis