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Rock magnetic study of widespread tephra recovered from Lake Biwa sediments

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Many tephra layers have been found in the Lake Biwa sediments through the series of coring study since early 1970. These are considered to be the standard of tephra layers in West Japan, which give one of principal information in studying Quaternary geology of Japanese islands. Many previous studies have identified tephra by various methods, such as the mineral composition and index of volcanic glass shard. A few rock magnetic studies were applied to the tephra around Lake Biwa (e.g., Maenaka and Yokoyama, 1972). The analysis of high accuracy have become possible, and rock magnetic study of Alaskan tephra is being reviewed in recent years (Lagroix et al., 2004). Magnetic minerals are essential minerals in magma having complex combination of iron-titanium oxides, which may become as an additional method for the identification.

We have just begun rock magnetic study for identification of the tephra recovered from BIW08-A and -B cores (2008). The oldest ages of BIW08-A and BIW08-B cores are estimated as c.200ka and c.300ka, respectively. Tephra samples of U-Oki (Ulleung Island), AT (Aira Tn), Sambe series (Sambe volcano origin), Aso series (Aso volcano origin), and Daisen series (Daisen volcano origin) were collected from the cores. Some reference samples were also collected from the legacy core of the 1400 m-long (1982).

High- and low-temperature magnetic measurements and analysis of isothermal remanent magnetization (IRM) were applied to the samples. The temperature-dependent magnetic properties, such as the Curie temperature and the Verwey transition, show the co-existence of titano-magnetites and titano-hematites. Magnetic constituents are mainly estimated with a method called IRM unmixing. Synthesized data could suggest the variety of magnetic minerals contained in tephra samples. The results of this study could divide Daisen series into two categories. This study is still on going, but will be an independent and helpful method for the tephra identification.