

Magnetic properties of surficial sediments of Lake Ogawara, Aomori Prefecture

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Lake Ogawara in Aomori Prefecture is a blackish water lake, which is connected through Takase-gawa River and an artificial sluice to the Pacific Ocean. While the average water depth of the lake is about 11 m, the central part is 15 to 20 m deep. With a year-round halocline layer at a depth around 10 m, the bottom to middle water is in anoxic condition. In 2009, core samples of the Holocene sediments of 20 m long in total were recovered from 3 holes in the central part and subjected to a multi-disciplinary research for reconstruction of paleoenvironment and paleoclimate. When the 2011 off the Pacific coast of Tohoku Earthquake occurred, tsunami waves flooded into the lake through the Takase-gawa River and the sluice. This observation suggests a possibility that the lake sediments have archived tsunami and earthquake events in the past. Then, in order to understand limnological condition of Lake Ogawara, and also aiming detection of the recent tsunami deposits, systematic survey and sampling of lake water and surficial sediments were carried out in August to September, 2011. Here we report a preliminary result of magnetic measurements of the sediment samples dredged with an Ekman-Birge bottom sampler.

We measured weak-field magnetic susceptibility using a Bartington MS3 meter with an MS2C sensor and also on an AGICO KLY-3 KappaBridge to estimate anisotropy of the magnetic susceptibility. The susceptibility values range from 10⁻⁵ to 10⁻³ SI. The higher values were found at the sites around the mouth of the Shichinohe-gawa River entering to the lake and at the sites close to the Takase-gawa River. These data suggest that magnetic minerals of detrital origin were transported into the lake from the watershed in the west and also by erosion of the sandbar along the passway to the Pacific Ocean. Most of the AMS ellipsoids showed oblate shape with horizontal alignment, showing no systematic directional trends of the sediment supply.

Keywords: Lake Ogawara, environmental magnetism, magnetic susceptibility, tsunami deposit