The origin of magnetic minerals and their changes in the sediment from Lake Nakaumi and Lake Shinnji, Japan

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Rockmagnetic and paleomagnetic investigations have been performed on four sediment cores collected by a Mackereth type corer from Lake Nakaumi and Lake Shinnji, Sanninn district, Japan. Magnetic properties of river sediments taken from typical geological units exposed in the catchment areas of the lakes have been also investigated to study changes of the origin of the magnetic minerals in two lakes.

The magnetization of these sediments is stable enough to detect paleosecular variations of geomagnetic field. As these cores have not yet been dated, the sedimentation rates of the cores were tentatively estimated by correlation of the secular variations with the archaeomagnetic study for the past 2000 years in southwestern Japan (Shibuya, 1980).

The rockmagnetic measurements showed that the magnetic-mineral contents are increased in the uppermost portion of the cores. Especially in the core from Lake Shinnji, the increase is very rapid and on average they are about ten times as much as those in the lower portion of the core.

XRD analysis for the magnetic extract from the sediments of two lakes shows that the predominant magnetic mineral in the lower part of the cores is the solid solution between ilmenite and hematite, and one in the uppermost part is magnetite.

Granite containing a large amount of magnetite is distributed widely in the catchment areas and it is well known in these areas that after the beginning of the 17th century, weathered granite had been broken down on a large scale in order to extract the iron sand used for iron manufacture. The water of the Hii River has been flowing to the sea through Lake Shinnji and Lake Nakaumi now. But, it had been flowing directly into the sea before two times of the floods in the 17th century. The possible cause of the enrichment of magnetite in the uppermost part of the cores is thought to be this industrial activity and/or the change in the Hii River's flow route.