

The formation process of the lamina in sediments of Lake Abashiri, North Japan

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Lake Abashiri in the eastern part of Hokkaido is connected with the Sea of Okhotsk through Abashiri River. The water column of Lake Abashiri has a distinct halocline around 5m depths, and is divided into oligohaline epilimnion and polyhaline hypolimnion by metalimnion (halocline). The hypolimnion in Lake Abashiri shows the euxinic conditions throughout the annual. For eutrophication, the epilimnion is often observed the blooming of phytoplankton. In spring season (ice melting season) and late summer season (flood season), high turbidity river water is flowing from the Abashiri River.

The sediment of Lake Abashiri is observed a lamination by soft-X ray photograph. The 10AB-5C core, collected from 15.9 m of water depth in the center of Lake Abashiri, is composed of muddy sediment with a distinct lamination through all horizons. Result of observation of soft-X ray photograph, the lamina set of high-density layer, low-density layer, and intermediate-density layer are recognized. The Ta-a tephra (AD 1739) and Ko-c2 tephra (AD 1694) are found at the horizon of 250 cm, and 291 cm, respectively. Sedimentation rate based on these ages was 0.92cm/yr between Ko-c2 tephra and Ta-a tephra, and was 0.91cm/yr between surface and Ta-a tephra. Lamina set of 44 was recognized between Ko-c2 tephra and Ta-a tephra. This is suggested that this set is annual lamina. If so, high-density layers of lamina set are indicated the flood season from the patterns of precipitation in Abashiri Area. When distinct floods have been recorded, high-density layer is clear and thick. High-density lamina set series and low-density lamina set series are repeated in 20-30 year cycle. High-density lamina set series corresponds to the period of continuously high precipitation. This is suggested that high-density layer indicate the flood season in late summer.

In order to clarify the formation process of the lamina set in Lake Abashiri, we are observed by a sediment trap. Sediment traps are set up above 2m from lake bottom in water mass under euxinic environment. Result of this observation, sediment flux is increased in early spring (ice melting) and late summer (flood) seasons. Sediment flux in early spring season is higher than late summer season. Total organic carbon (TOC) contents of trapped sediment are higher than surface sediments except for trapped sediment in early spring season. These are suggested that low-density layer indicate in early spring (ice melting) season. In winter (ice) and early summer seasons, the sediment flux is low, and TOC contents show the high value. This is suggested that the limited supply of inorganic sediment. In this time, the diatom lamina may be formed in lamina set.

Keywords: Lake Abashiri, euxinic environment, lamina set, varve, Sediment trap, Total organic carbon contents