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Anthropogenic changes of the eutrophied Lake Mokoto recorded in lake sediments in the east part of Hokkaido, Japan

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In the coastal area of the Sea of Okhotsk in the east part of Hokkaido located to for subarctic zone, many brackish-water lakes are distributed. Especially, the Okhotsk brackish-water lake group around Abashiri City is constituted by major lake in Japan such as Lake Abashiri, Lake Mokoto, Lake Tofutsu, and Lake Notoro. The each lake shows a different present environment and history. Therefore, the change that is common in those lakes seems to be the change concerning the climate. In this study, anthropogenic change in Lake Mokoto is discussed by sedimentologic and geochemical high-resolution analysis of the cores collected from Lake Mokoto.

Mokoto has two-layer structure of intermediate salinity surface waters and high salinity bottom water (below water depth 1m). The bottom water in Lake Mokoto shows the anoxic conditions in summer season.

The cores collected from Lake Mokoto shows the length of 1.78 to 3.87m. In Lake Mokoto, there was the Ta-a tephra (AD 1739) at the 3.5m depths.

The cores collected from Lake Mokoto consist of organic mud with the lamination in all cores. In 09Mk-1C core, the core top 100 cm shows the black (N1.5/0, L value: ca 5), and it seems to indicate the seasonal anoxic environment as present. The organic mud below 100cm depth shows black (10YR1.7/1, 2/1, L values: ca 15). In the observation by the soft X-ray photograph, the cyclic lamina set is observed in the core from Lake Mokoto. It is considered that this cyclic lamina set is the verge. According to the meteorological data in Abashiri region, the annually precipitation is high from August to September. Probably, the cyclic lamina set is formed by cyclic change of precipitation.

Phosphorus contents in 09Mk-1C core show the relatively high values (ca 0.1wt%) above 100cm depth. However, Phosphorus is not detected below this horizon. The increasing of phosphorus contents may be caused by drainage of pollution from stock farm. The horizon of phosphorus increasing is estimated to AD1957 from the number of cyclic lamina set. In report, domestic animal increased at AD1955 in the drainage basin. This timing is consistent with phosphorus increasing.

The thickness of lamina set is about 7mm before late 1960's for the age of cyclic lamina set. After that, the thickness of lamina set is about 25mm. It is suggest that Lake Mokoto is aggrading by sediment from drainage basin under high sedimentation rate.

Keywords: Lake Mokoto, lamina, Ta-a tephra, anoxic, phosphorus, sedimentation ratio