

The formation process of the precipitation type lamina and the estimation of paleo-precipitation in the coastal lagoon

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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. Lake Mokoto has two-layer structure of polyhaline surface waters and mixoeuhaline bottom water. The bottom water shows the anoxic conditions in summer season. In this reason, the sediments of Lake Mokoto consist of organic mud with the lamination. The 09Mk-1C and 09Mk-2C cores collected from Lake Mokoto at 2009. In the soft X-ray photograph, the cyclic lamina set is observed in their core. It is considered that this cyclic lamina set is the varve depending on summer precipitation from result of core analysis. In 2015, we were able to take the new core (15Mk-3C core). We have observed a new lamina set in detail from 2009 to 2015, and compared with precipitation pattern in Abashiri Region. And we are discussed about the possibility of paleo-precipitation analysis from the past of the lamina pattern.

As a result of comparison with 15Mk-3C and 09Mk-1C cores using by the soft X-ray photograph, it is possible to correlate with the two cores in lamina level except for some horizons. Because of correlation lines are substantially parallel, the two cores are seems to shows the same sedimentation rates. From the correlation of two cores, new sediments show the 13cm during about 6 years (sedimentation rate: 2.2 cm/y).

New sediments are subsampled in ca.1.25 mm interval, and were carried out CNS elemental analysis. In low density lamina, Total organic carbon (TOC) , total nitrogen (TN) and total sulfur (TS) contents show the high values, and C/N ratios show the low values. In high density lamina, these parameters had the opposite tendency. These results are suggested that the sediments of high density lamina deposited during the precipitation time.

It compared the lamina and precipitation patterns during 6 years. Relatively high density lamina was identified 116 lamina. On the other hand, the total precipitation of >20mm of 7 days has been observed 108 times. Therefore, if the formation of relatively high density lamina is due to rainfall, it would be formed by the 7 days total precipitation of >20mm. High density lamina set corresponds to when the 7 days total precipitation of >60m is continuously occur in a short term. The combination patterns of lamina and lamina set almost coincides with the precipitation pattern. For this reason, high density lamina are formed during precipitation term.

However, there was no significant difference in the thickness of the high density lamina when low and high precipitation. It is considered that the excess water mass containing the suspension is discharged from the system without being deposited in the lake. Thick high density lamina set, such as those found in this core, seems to be a thick high density lamina in the condition of low sedimentation rate. A thick high density lamina correspond to when the annual precipitation amount is large. Therefore, there will be possibility of estimating the degree of precipitation by analyzing the thickness of high density lamina.

Keywords: precipitation type lamina, paleo-precipitation, Varve, Lake Mokoto